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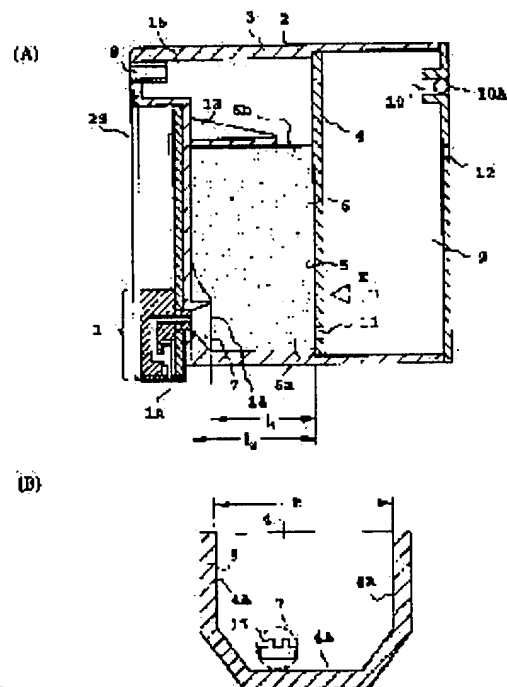
JP

## (54) INK TANK, RODUCTION THEREOF, INK JET CARTRIDGE AND INK JET RECORDING APPARATUS

(57)Abstract:

PURPOSE: To always stably perform recording even in a case experiencing any posture and environmental conditions of delivery as an ink jet cartridge.

CONSTITUTION: An ink tank is equipped with a first housing chamber 6b having the ink supply port 7 supplying ink to an ink jet head and an atmosphere communication part 8 and housing a negative pressure generating member 6 and the second housing chamber 9 communicating with a first housing chamber 5 only through a fine communication part 11 but held to a substantially hermetically closed state. The fine communication part 11 is arranged at the position almost opposed to the ink supply port 7 through the negative pressure generating member 6 and the region 6a held between the ink supply port 7 and the fine communication part 11 of the negative pressure generating member 6 is held to a high compression state as compared with the other region 6b of the member 6.



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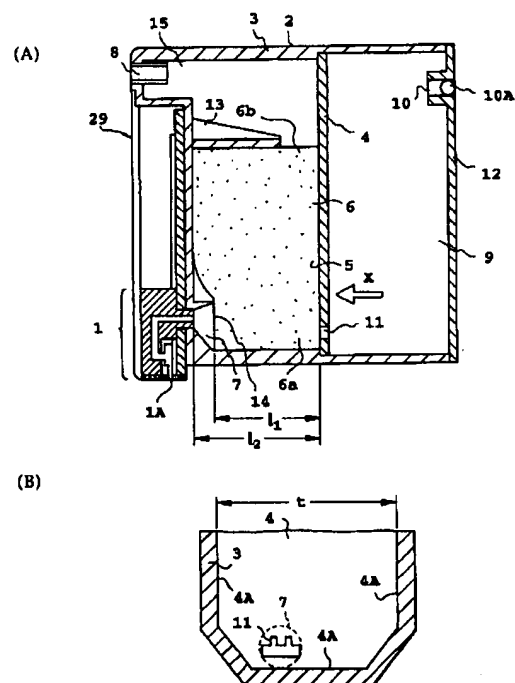
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(54) 【発明の名称】 インクタンクと該インクタンクの製造方法、インクジェットカートリッジ、およびインクジェット記録装置

(57) 【要約】  
【目的】 インクジェットカートリッジとして物流等のいかなる姿勢および環境条件を経験した場合でも常に安定に記録を行えるインクタンクおよびインクジェットカートリッジさらにこれらを用いたインクジェット記録装置を提供する。

【構成】 インクジェットヘッドにインクを供給するインク供給口7と大気に通ずる大気連通部8とを備えかつ負圧発生部材を収容した第1収納室6bと、微小連通部11のみを介して前記第1収納室5に連通するが実質的に密閉状態の第2収納室9とを備えたインクタンクであって、前記微小連通部11は前記負圧発生部材を挟んで前記インク供給口7に対して略対面の位置に配置されており、かつ前記負圧発生部材6の前記インク供給口7と前記微小連通部11とに挟まれた領域6aは他の領域6bに比して高圧縮に保持されている。



【特許請求の範囲】

【請求項1】 インクジェット装置に着脱自在とされるインクジェットヘッドとインクタンクとを備えたインクジェットカートリッジのインクタンクにおいて、

前記インクタンクを構成する容器本体と、該容器本体内部を第1収納室と第2収納室とに分割する仕切り壁とを具え、

前記第1収納室は、前記仕切り壁と対向した面に設けられた、前記インクジェットヘッドが連結し、インクを供給するインク供給口と、大気に連通する大気連通部とを備え、かつ負圧発生部材を収納し、

前記仕切り壁はインク供給口と略対面した領域に、前記第2収納室から前記第1収納室へのインクの移動と、前記第1収納室から前記第2収納室への空気の移動とを行わせる微小連通部を備え、および前記インク供給口と前記微小連通部とを結ぶ経路にある前記負圧発生部材は、他の領域に比して高圧縮に保持されていることを特徴とするインクタンク。

【請求項2】 前記インク供給口の周囲は内方へ突出していることを特徴とする請求項1に記載のインクタンク。

【請求項3】 前記インクジェットヘッドはインクを導入するためのインク供給管を備えており、前記インク供給管が、前記負圧発生部材側へ突出していることを特徴とする請求項1に記載のインクタンク。

【請求項4】 前記容器の前記仕切り壁から前記突出部の内方へ突出している部分までの長さ、前記仕切り壁から該仕切り壁に対向する第1収納室のインク供給口が配されていない領域までの長さの比が、 $2/3$ から $3/4$ の範囲であることを特徴とする請求項2に記載のインクタンク。

【請求項5】 前記容器の仕切り壁から該仕切り壁に対向する第1収納室のインク供給口が配されていない領域までの長さより、前記容器の奥行きが長いことを特徴とする請求項4に記載のインクタンク。

【請求項6】 前記容器の前記仕切り壁から前記インクジェットヘッドのインク供給管の内方へ突出している部分までの長さ、前記仕切り壁から該仕切り壁に対向する第1収納室のインク供給管が配されていない領域までの長さの比が、 $2/3$ から $3/4$ の範囲であることを特徴とする請求項3に記載のインクタンク。

【請求項7】 前記容器の仕切り壁から該仕切り壁に対向する第1収納室のインク供給管が配されていない領域までの長さより、前記容器の奥行きが長いことを特徴とする請求項6に記載のインクタンク。

【請求項8】 前記負圧発生部材の前記第1収納室に收容される前の寸法の、当該第1収納室の内寸法に対する比が領域によって異なり、前記インク供給口と前記微小連通部に挟まれる領域に相当する領域が他の領域より大きく設定されていることを特徴とする請求項1に記載の

インクタンク。

【請求項9】 前記微小連通部は仕切り壁によって囲まれていることを特徴とする請求項1に記載のインクタンク。

【請求項10】 前記インク供給口の前記第1収納室側にフィルタが設けられており、当該フィルタに前記負圧発生部材が圧接されることを特徴とする請求項1に記載のインクタンク。

【請求項11】 前記第1収納室の大気連通部近傍には、前記負圧発生部材の存在しない領域があることを特徴とする請求項1に記載のインクタンク。

【請求項12】 前記容器内部には、前記仕切り壁を所定位置に固定するための段差を具備することを特徴とする請求項1に記載のインクタンク。

【請求項13】 少なくとも前記第2収納室を形成する外壁のうち一面が透光性を有していることを特徴とする請求項1に記載のインクタンク。

【請求項14】 少なくとも前記第2収納室のインクが所定量以下になったことを検知するための手段を具備することを特徴とする請求項1に記載のインクタンク。

【請求項15】 前記インクが所定量以下になったことを検知するための手段として、前記第2収納室を形成する透光可能な外壁と前記第2収納室内に配設した反射板を有することを特徴とする請求項14に記載のインクタンク。

【請求項16】 前記インクが所定量以下になったことを検知するための手段として、前記第2収納室内でインクに接するように配設された少なくとも一対の電極を有することを特徴とする請求項14に記載のインクタンク。

【請求項17】 インクジェット装置に着脱自在とされるインクジェットヘッドとインクタンクを備えたインクジェットカートリッジのインクタンクにおいて、一端が開放された容器と、

該容器の開放部に相対する面に設けられたインク供給口と、

前記開放部に相対向する面に対して接するように前記開放部から收容される負圧発生部材と、

前記開放部から收容された前記負圧発生部材に対して接し、開放部に相対向して当該容器内壁に対して密接的に接合されて前記容器を第1収納部と第2収納部とに仕切るとともに、前記第1収納部と前記第2収納部とを連通させる微小連通部を有する仕切り壁と、

前記容器の開放部を覆うことで前記仕切り壁との間に前記第2収納室を構成する蓋部材と、

を具え、前記負圧発生部材の前記インク供給口と前記微小連通部とに挟まれた領域が他の領域に比して高圧縮に保持されていることを特徴とするインクタンク。

【請求項18】 前記インク供給口の周囲は内方へ突出していることを特徴とする請求項17に記載のインクタ

ンク。

【請求項 19】 前記インクジェットヘッドはインクを導入するためのインク供給管を備えており、前記インク供給管が、前記負圧発生部材側へ吐出していることを特徴とする請求項 17 に記載のインクタンク。

【請求項 20】 前記容器の前記仕切り壁から前記突出部の内方へ突出している部分までの長さ、前記仕切り壁から該仕切り壁に対向する第 1 収納室のインク供給口が配されていない領域までの長さの比が、 $2/3$  から  $3/4$  の範囲であることを特徴とする請求項 18 に記載のインクタンク。

【請求項 21】 前記容器の仕切り壁から該仕切り壁に対向する第 1 収納室のインク供給口が配されていない領域までの長さより、前記容器の奥行きが長いことを特徴とする請求項 20 に記載のインクタンク。

【請求項 22】 前記容器の前記仕切り壁から前記ヘッドのインク供給管の内方へ突出している部分までの長さ、前記仕切り壁から前記仕切り壁に対向する第 1 収納室のインク供給口が配されていない領域までの長さの比が、 $2/3$  から  $3/4$  の範囲であることを特徴とする請求項 19 に記載のインクタンク。

【請求項 23】 前記容器の仕切り壁から該仕切り壁に対向する第 1 収納室のインク供給管が配されていない領域までの長さより、前記容器の奥行きが長いことを特徴とする請求項 22 に記載のインクタンク。

【請求項 24】 前記負圧発生部材の前記第 1 収納室に收容される前の寸法の、当該第 1 収納室の内寸法に対する比が領域によって異なり、前記インク供給口と前記微小連通部に挟まれる領域に相当する領域が他の領域より大きく設定されていることを特徴とする請求項 17 に記載のインクタンク。

【請求項 25】 前記微小連通部は仕切り壁によって囲まれていることを特徴とする請求項 17 に記載のインクタンク。

【請求項 26】 前記インク供給口の前記第 1 収納部側にフィルタが設けられており、当該フィルタに前記負圧発生部材が圧接されることを特徴とする請求項 17 に記載のインクタンク。

【請求項 27】 前記第 1 収納室の大気連通部近傍には、前記負圧発生部材の存在しない領域があることを特徴とする請求項 17 に記載のインクタンク。

【請求項 28】 前記容器内部には、前記仕切り壁を所定の位置に固定するための段差を具備することを特徴とする請求項 17 に記載のインクタンク。

【請求項 29】 少なくとも前記第 2 収納室を形成する外壁のうち一面が透光性を有していることを特徴とする請求項 17 に記載のインクタンク。

【請求項 30】 少なくとも前記第 2 収納室のインクが所定量以下になったことを検知するための手段を具備することを特徴とする請求項 17 に記載のインクタンク。

【請求項 31】 前記インクが所定量以下になったことを検知するための手段として、前記第 2 収納室を形成する透光可能な外壁と前記第 2 収納室内に配設した反射板を有することを特徴とする請求項 30 に記載のインクタンク。

【請求項 32】 前記インクが所定量以下になったことを検知するための手段として、前記第 2 収納室内でインクに接するように配設された少なくとも一対の電極を有することを特徴とする請求項 30 に記載のインクタンク。

【請求項 33】 インクジェットプリンタに対して着脱自在に構成されるインクタンクの製造方法において、一端面に開口部を有し、開口部と相対する面に、インクジェット記録ヘッドにインクを供給するインク供給口と大気に連通する大気連通部とを備える容器を用意する工程と、

前記容器の前記開口部の相対向する面に接するように前記開口部から負圧発生部材を收容する工程と、微小連結部を有する仕切り壁を開口部に、前記負圧発生部材および容器周囲に密着するように仕切り壁を挿入する工程と、

前記容器の開口部に蓋部材を接合する工程と、

を有したことを特徴とするインクタンクの製造方法。

【請求項 34】 前記仕切り壁を挿入する工程において、前記負圧発生部材を、前記インク供給口と前記微小連通部に挟まれた領域が他の領域に比して高圧縮に保持されるように密着することを特徴とする請求項 33 に記載のインクタンクの製造方法。

【請求項 35】 前記大気連通口、およびインク供給口を密閉し、前記容器あるいは前記蓋部材上に存在するインク注入口から減圧注入によってインクを注入する工程を有することを特徴とする請求項 33 に記載のインクタンクの製造方法。

【請求項 36】 前記インクを注入する工程において、前記容器を第 1 収納室が第 2 収納室の鉛直上方になるような姿勢でインクを減圧注入することを特徴とする請求項 35 に記載のインクタンク製造方法。

【請求項 37】 前記インクを注入する工程において、インクを所定量注入直後、前記大気連通口を開放し、タンク内に残る負圧を解消する工程を有することを特徴とする請求項 35 に記載のインクタンクの製造方法。

【請求項 38】 前記インクを注入する工程において、注入するインクの組成に、界面活性剤を含まないことを特徴とする請求項 35 に記載のインクタンクの製造方法。

【請求項 39】 請求項 1 に記載のインクタンクと、該インクタンクの前記インク供給口に接合されるインクジェットヘッドからなることを特徴とするインクジェットカートリッジ。

【請求項 40】 請求項 17 に記載のインクタンクと、

該インクタンクの前記インク供給口に接合されるインクジェットヘッドからなることを特徴とするインクジェットカートリッジ。

【請求項41】 請求項33に記載の製造方法によって製造されるインクタンクと、該インクタンクの前記インク供給口に接合されるインクジェットヘッドからなることを特徴とするインクジェットカートリッジ。

【請求項42】 前記インクジェットヘッドは、インクを吐出するための吐出口を有する液流路と、前記インク吐出口からインクを吐出するための発熱抵抗素子を有することを特徴とする請求項39に記載のインクジェットカートリッジ。

【請求項43】 前記インクジェットヘッドは、インクを吐出するための吐出口を有する液流路と、前記インク吐出口からインクを吐出するための発熱抵抗素子とを有することを特徴とする請求項40に記載のインクジェットカートリッジ。

【請求項44】 前記インクジェットヘッドは、インクを吐出するための吐出口を有する液流路と、前記インク吐出口からインクを吐出するための発熱抵抗素子とを有することを特徴とする請求項41に記載のインクジェットカートリッジ。

【請求項45】 請求項39に記載のインクジェットカートリッジを備えたインクジェット記録装置であって、前記インクジェットヘッドカートリッジが記録装置本体に対して着脱可能であることを特徴とするインクジェット記録装置。

【請求項46】 請求項40に記載のインクジェットカートリッジを備えたインクジェット記録装置であって、前記インクジェットヘッドカートリッジが記録装置本体に対して着脱可能であることを特徴とするインクジェット記録装置。

【請求項47】 請求項41に記載のインクジェットカートリッジを備えたインクジェット記録装置であって、前記インクジェットヘッドカートリッジが記録装置本体に対して着脱可能であることを特徴とするインクジェット記録装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、インクジェット記録用のインクを保有するインクタンク、それに記録ヘッドを備えたインクジェットカートリッジ、それを製造する製造方法に関する。本発明は、インクジェット技術を使用する、複写機、ファクシミリ等の記録機器、通信機器、事務機器、複合機器、プリンタ等に適用可能である。

【0002】なお、ここで、記録とは、文字等の意味のある画像だけでなく、パターン画像等の無意味な画像をも含むものである。記録機器は、各種情報処理装置全てあるいはその出力器としてのプリンタを含むものであ

る。

【0003】

【従来の技術】パソコン端末、コピー、FAX等の出力装置として、熱転写・LBP・ドットインパクト、インクジェット等の方式が用いられた記録装置が使用されている。各種記録方式のなかで、インクジェット方式は、静粛性に優れる印刷方法として注目を浴びているが、このうち加熱による液体の発泡を利用したものは、記録ヘッドの構成上高密度化が容易である・静粛性に優れる・カラー化が容易・高速印刷に耐え得る等の優れた特徴を有し、高品位で安価な印刷方法として注目を浴びている。インクジェット記録装置に適用される記録手段の一例として、インクジェット記録ヘッドとインクジェット記録ヘッドに供給されるインクを貯留するインクタンクとを一体化し、装置の備える走査キャリッジに対して交換可能とする形態のインクジェットカートリッジがある。

【0004】ところで、インクジェットカートリッジは、インクタンク内のインクが記録ヘッドから吐出できない状態になると、ヘッドと共に廃棄される。つまり、インクジェットカートリッジのインクタンクは、内部に負圧発生体が収納され、これにインクが保持されており、記録ヘッドに対して所望の負圧が発生するようになっているが、インクの消費に伴って負圧発生体によって生じられる負圧が次第に大きくなり、記録ヘッドからのインクの吐出に応じたインクのリフィルが行えなくなり、インクジェットカートリッジの使用が不可能となる。ところで、この状態のカートリッジ内には、負圧発生体の能力にもよるが比較的多くのインクが残存してしまっていた。インクの残存量は、インクタンク内のほぼ全体に収納されている負圧発生体であるスポンジのインク保持能力に支配されるのがスポンジの能力を改善することは容易ではない。

【0005】また、負圧発生体は、インク消費に応じて負圧が徐々に大きくなる方向に変化してしまい、ほぼ一定の負圧を使用開始から終了まで維持することが困難であった。このようなインクジェットカートリッジの一例として特開昭63-87242号が挙げられる。

【0006】かかる現状に対して、実質的にインクのみを保持する構成を採用したインクジェットカートリッジが開発されている。例えば、特開平2-522号公報には、上方に位置してインクのみを大量に保持する1次インク貯蔵部と、下方に位置したインクジェット記録ヘッドとの間にわずかな多孔質部材を配置したインクジェットカートリッジが開示されている。この発明では、多孔質部材をインク貯蔵部には内蔵せずにインク流路中に配置したことによりインクの使用効率を向上出来るとしている。また、多孔質部材の側方にインクを保持可能な空間としての2次インク貯蔵部を設けることにより、温度上昇（圧力低下）が生じた場合等の環境変化があった場

合に1次インク貯蔵部内の空気が膨張することによる1次インク貯蔵部からの流出インクを溜め、記録時の記録ヘッドへの負圧を実質上一定に維持出来るとしている。

【0007】

【発明が解決しようとする課題】しかしながら、上述した公報の発明では、非記録時においては、上方に位置してインクのみを大量に保持する1次インク貯蔵部からのインクにより多孔質部材はインクが充分過ぎるほど含浸せしめられているので、多孔質部材自体の負圧の発生がほとんど無くなっている。そのため、わずかな衝撃によりインクジェット記録ヘッドのオリフィスからインクが漏れることが生じ得、実用に適したものとは必ずしも言えない。

【0008】一方、特開平7-125232号公報には、インクタンク部の内部をほぼ半分に壁によって2分割し、記録ヘッドが装着される側の室に負圧発生体を収納した構成が開示されている。そして、分割壁と底部との間に連通部を有しており、インクの供給がなされるようになっている。この出願では、記録ヘッド部とインクタンク部とは分離可能な構成として開示されており、記録ヘッド部がインクタンク部に取り付けられたとき、記録ヘッド部が備えたインク供給管がインクタンク部の負圧発生体側に挿入されることになるが、これによってインク供給管の周囲の負圧発生体が圧縮される領域となっていることが開示されている。

【0009】このインクタンク部の構成を記録ヘッドを一体的に備えるインクジェットカートリッジに適用したところ、インク供給に関しては良好な結果が得られたが、物流状態における安定性を検討すると例えばカートリッジの配置、温度変化、気圧変化、振動、衝撃などの環境の変化によっては負圧発生体内に空気が入り込みインクの分布が変化する場合が考えられる。したがって連通部とインク供給管との間の領域に存在する負圧発生部材に保持されているインクにも分布が生じる場合が考えられ、この状態で、記録装置に搭載し、初期回復動作を実行した場合連通部からインク供給管に至る間のインク経路において、介在した空気がインク供給管側に移動し、十分なインクの通路が確保できなくなることが起こり得る。

【0010】ところで、特開平7-125232号公報に開示されるインクタンクは、底部が開放され、分割壁を一体的に有した2分割された部材に対して負圧発生部材を底部から挿入し、最後に底部壁を接合することで構成されると開示される。しかし、これはインクタンクのみを構成するもので、記録ヘッドを一体的に備えるインクジェットカートリッジの製造にあたって、適用することは難しい。

【0011】本発明の主たる目的は、上記従来技術で着眼された課題を解消し、かつインクジェットカートリッジとして物流等のいかなる姿勢および環境条件を経験し

た場合でも常に安定に記録ヘッドに対してインクの供給が行え、その結果良好な記録を行えるインクタンクおよびインクジェットカートリッジおよび該カートリッジの製造方法を提供することにある。

【0012】本発明の他の目的は、簡単な構成でかつ安価にインクタンクおよびインクジェットカートリッジおよび該インクジェットカートリッジの製造方法を提供することにある。

【0013】本発明の他の目的は、インクジェット装置に着脱自在とされるインクジェットヘッドとインクタンクとを備えたインクジェットカートリッジの以下の構成を有するインクタンクを提供することである；前記インクタンクを構成する容器本体と、該容器本体内部を第1収納室と第2収納室とに分割する仕切り壁。

【0014】ここで、前記第1収納室は、前記仕切り壁と対向した面に設けられた、前記インクジェットヘッドが連結し、インクを供給するインク供給口と、大気に連通する大気連通部とを備え、かつ負圧発生部材を収納している。

【0015】また、前記仕切り壁はインク供給口と略対面した領域に、前記第2収納室から前記第1収納室へのインクの移動と、前記第1収納室から前記第2収納室への空気の移動とを行わせる微小連通部を備える。

【0016】そして、前記インク供給口と前記微小連通部とを結ぶ経路にある前記負圧発生部材は、他の領域に比して高圧縮に保持されている。

【0017】本発明の他の目的は、インクジェット装置に着脱自在とされるインクジェットヘッドとインクタンクを備えたインクジェットカートリッジの以下の構成を有するインクタンクを提供することである；一端が開放された容器。

【0018】該容器の開放部に相対する面に設けられたインク供給口。

【0019】前記開放部に相対向する面に対して接するように前記開放部から収容される負圧発生部材。

【0020】前記開放部から収容された前記負圧発生部材に対して接し、開放部に相対向して当該容器内壁に対して密接的に接合されて前記容器を第1収納部と第2収納部とに仕切るとともに、前記第1収納部と前記第2収納部とを連通させる微小連通部を有する仕切り壁。

【0021】前記容器の開放部を覆うことで前記仕切り壁との間に前記第2収納室を構成する蓋部材。

【0022】これによって、前記負圧発生部材の前記インク供給口と前記微小連通部とに挟まれた領域が他の領域に比して高圧縮に保持されている。

【0023】本発明の他の目的は、以下の工程を含むインクジェットプリンタに対して着脱自在に構成されるインクタンクの製造方法を提供することである；一端面に開口部を有し、開口部と相対する面に、インクジェット記録ヘッドにインクを供給するインク供給口と大気に連

通する大気連通部とを備える容器を用意する工程。

【0024】前記容器の前記開口部に相対向する面に接するように前記開口部から負圧発生部材を収容する工程。

【0025】微小連結部を有する仕切り壁を開口部に、前記負圧発生部材および容器周囲に密着するように仕切り壁を挿入する工程。

【0026】前記容器の開口部に蓋部材を接合する工程。

【0027】

【課題を解決するための手段】本発明では、以上の構成により、微小連通部とインク供給口との間の負圧発生部材の圧縮が高く保持されている。したがって、第2収納室内のインクは微小連通部から高圧縮領域、すなわち毛管力の大きい領域に直接導入されてそのままインク供給口へと導かれることから、どんな保存状態におかれても常にインクが第2収納室から供給口へと安定して供給できる。つまり、負圧発生部材の他の領域のインクの状態に無関係でインク供給路が保たれる。また、インク供給口の内側端部に負圧発生部材と圧接する形でフィルタを設けることによりフィルタ部にメニスカスがで、負圧発生部材側からインクとともに供給されようとする微小気泡をトラップすることができより効果的である。

【0028】

【発明の実施の形態】以下、図面を参照して本発明の実施形態を詳細に説明する。

【0029】図1(A)は本発明の一実施形態にかかるインクジェットカートリッジを示す断面を示すものであり、(B)は図中X方向から見た部分を拡大して示すものである。

【0030】図1(A)において、インクジェットカートリッジはインクジェット記録ヘッド1を具備するインクジェットユニット29と、該インクジェットユニットに供給するインクを収容するインクタンク部2とに分けられる。

【0031】ここで、前記インクタンク部2は、タンク容器3と蓋部材12、および仕切り壁4により構成されているが、前記仕切り壁4によって、第1収納室5と第2収納室9とに分割された構造となっている。

【0032】前記第1収納室5は、負圧発生部材6を収容し、該負圧発生部材6へ大気を供給する大気連通部8と、前記インクジェット記録ヘッド1へインクを供給するインク供給口7とを具備する。

【0033】該インク供給口には前記インクタンク部2内のゴミを排除するためのフィルタ14が設けられている。

【0034】また、前記大気連通部8と前記負圧発生部材6との間には、充分な大気連通空間15が存在し、該大気連通空間15は、前記負圧発生部材6を圧縮保持する押さえ板13によって形成されている。

【0035】前記仕切り壁4上には、前記インク供給口7とほぼ対向する位置に微小連通部11が存在する。

【0036】該微小連通部11は、前記仕切り壁4によって周囲を囲まれており、前記タンク容器3と前記仕切り壁4との境界4Aからは離れている。

【0037】前記第2収納室9は、前記微小連通部11で前記第1収納室5に連通しており、前記第1収納室に供給するインクのみを収容するものである。

【0038】インクは、蓋部材12上のインク充填口10から前記第2収納室9に注入される。インク注入後、前記インク注入口19からのインク漏れを防止するため、前記インク充填口10はSUS製ボール10Aによって封止される。

【0039】本実施形態におけるインク供給について説明する。

【0040】インクジェット記録装置が稼働するとインクジェット記録ヘッドのオリフィスからインクが吐出されインクタンク1Tにインク吸引力が発生する。インクはこの吸引力により第2収納室(インク収納部)9から微小連通部11を通り第1収納室(負圧発生部材収納部)5へ、そして負圧発生部材6を通してインク供給部材7内に引き込まれインクジェット記録ヘッドへ供給される。

【0041】これにより微小連通部11以外は密閉しているインク収納部9の内部の圧力が低下し、インク収納部9と負圧発生部材収納部5との間に圧力差が生じる。記録が継続するとその圧力差は上昇を続けるが、負圧発生部材6は大気連通口8で大気に開放されているため、空気は負圧発生部材6を通して微小連通部11からインク収納部9に入る。この時点でインク収納部9と負圧発生部材収納部5との間の圧力差が解消される。インクジェット記録中はこの動作が繰り返され、ある一定の負圧がインクタンク内に得られる。また、インク収納部内のインクは、インク収納部内の壁面に付着するインク以外はほぼ全て使用できるためインク使用効率が向上する。

【0042】このインクタンク部の構造上重要なことはインク収納部9内のインクが微小連通部11を介してインク供給口17へ確実に供給されることである。本例においては、インク供給口7と微小連通部11とではさまれる領域に存在する負圧発生部材6aを他の領域に存在する負圧発生部材6bに比べて高圧縮状態に保持する構成を採用している。

【0043】ここで負圧発生部材収納部5に収容された負圧発生部材6のインク供給口7と微小連通部11との間に挟まれた領域を他の領域に比して高圧縮に保持せしめた状態について説明する。

【0044】負圧発生部材6は、第1収納室5に収納前は、ほぼ直方体の形状をしている。前記負圧発生部材6は図4に示すように、インクタンク本体3の開口部25から前記第1収納室5へ組み込まれる際に圧縮され、図



5に示すように仕切り壁4を前記インクタンク本体3に溶着封止することで、インク供給口7側の膨らみも、他の領域と同様に仕切り壁4に密着するまで圧縮される。

【0045】図1(B)に示すように、前記仕切り壁4に設けられた微小連通部11は前記インク供給口7にほぼ対面する位置に設けられているので、前記微小連通部11と前記インク供給口7の突出部26との間に挟まれた領域6aが、他の領域6bに比べて高圧縮となる。よってインク収納部9から供給されるインクは微小連通部11を出ると直接に微小連通部11と供給口7に挟まれた負圧発生部材6の高圧縮部に入り込みそのままインク供給口へと導かれる。

【0046】なお、吸収体の圧縮の様子を示す模式図を、図7に示す。

【0047】本発明では、以上の構成により、微小連通部11とインク供給口7との間の負圧発生部材6の圧縮が高く保持されている。したがって、第2収納室9内のインクは微小連通部11から高圧縮領域6a、すなわち毛管力の大きい領域に直接導入されてそのままインク供給口7へと導かれることから、どんな保存状態におかれても常にインクが第2収納室9から供給口7へと安定して供給できる。つまり、負圧発生部材6の他の領域のインクの状態に無関係でインク供給路が保たれる。また、インク供給口7の内側端部に負圧発生部材6と圧接する形でフィルタ14を設けることによりフィルタ部にメニスカスができ、負圧発生部材側からインクとともに供給されようとする微小気泡をトラップすることができより効果的である。

【0048】また、第1収納室5内の大気連通口8近傍を空間としたバッファ室15を形成して当該大気連通口8と負圧発生部材6との接触をなくすことで、大気連通口8からのインクもれをさらに防止する利点がある。

【0049】さらにまた、負圧発生部材6の該大気連通部側領域をインクを保持していない領域とすることで、環境条件の変動に対して、インクタンク内のインクが大気連通部から漏れることを防止できる利点がある。

【0050】また、使用状態にあつては、このインクを保持していない大気連通部側領域は、大気がカートリッジ内に必要に応じた量が効率よく供給でき、インクタンク内の負圧変化を抑制する効果もある。この大気連通部側領域は、全くインクによる濡れがないのもであると、インク自体の浸透速度をより減速させることができるので好ましいが、インクにより予め濡らした後にそのインクを除去した領域としても良い。

【0051】一方、本発明前提構成のインクタンク3は、操作者の手指に触れることになるが、通常は不都合は発生しにくい、強力に圧力を加えたりするとインクのみを収納する収納室9は大きさにもよるが変形しやすい。従って、この外圧による課題を解決する構成として、第1収納室5と第2収納室9との間隙を仕切る仕切

り壁4に形成された微小連通部11よりも大きな連通部を形成する仕切り板(不図示)をインクのみを収容する第2収納室に設けることは好ましいものである。また、変形の観点から、これらのカートリッジを樹脂で形成した場合には、実用上、インクのための収納室の壁の厚さ $T_i$ を0.8mm以上、負圧発生部材としてのスポンジ等を収納する収納室の壁の厚さ $T_s$ を1.3mm以上とすることが好ましい。更には、壁の厚さ $T_s$ は壁の厚さ $T_i$ の1.2倍以上3倍以下の範囲内にあることが実用上、より好ましいものと判明した。

【0052】ここで、本実施形態において、収納されている吸収体の圧縮率は約4.5倍程度とされている。これに対し、インク供給口7が設けられている部分とそれと対面する仕切り壁4との間はインク供給口7の周囲に突出部26が突出して設けられているため、領域6aは全体に渡り高圧縮部とされており、その領域の圧縮率は約6.3倍とされている。

【0053】上記構成を達成した図1(A)の示す吸収体収納部の長さ $l_2$ は約14mm、インク供給口突出部から仕切り壁までの長さ $l_1$ は約10mmであり、図1(B)に示される吸収体収納部の奥行き $t$ は約22mmである。

【0054】なお、本発明者等は、図1と同様の構成で、吸収体収納部の長さ $l_2$ が約15mm、インク供給口突出部から仕切り壁までの長さ $l_1$ が約10mmのタンクを試作した。この構成においても、本発明の期する高圧縮領域を形成することができ、インク収納部からインク供給口へ安定してインクを供給できる。

【0055】領域6aを高圧縮領域として形成するためには、吸収体収納部の長さ $l_2$ とインク供給口突出部から仕切り壁までの長さ $l_1$ の関係が重要な因子の一つとなる。インク供給口と仕切り壁までの長さがあまり長いと所望の高圧縮状態が領域6aにおいて得られなくなる恐れがある。逆に、インク供給口突出部から仕切り壁までの長さが、吸収体収納部の長さに比べてあまりに短い場合、領域6aは高圧縮領域として形成されるものの、インクの供給性が充分に得られなくなる恐れがある。

【0056】また、吸収体収納部の長さ $l_2$ と、吸収体収納部の奥行き $t$ との関係も重要な因子の一つである。吸収体収納部の長さ $l_2$ に対して、吸収体収納部の奥行き $t$ があまり狭いと、吸収体の奥行き方向の圧縮率が一樣に大きくなるために、高圧縮領域を容易に形成することは難しくなる。

【0057】そこで、本発明の期する領域6aに対して高圧縮領域を容易に形成するためには、インク供給口突出部から仕切り壁までの長さの、吸収体収納部の長さに対する割合が、 $2/3$ 以上 $3/4$ 以下であり、かつ、吸収体収納部の奥行きが、吸収体収納部の長さより長いことが望ましい。

【0058】ところで、本実施形態では図1(B)に示

すように、微小連通部11は容器本体3の壁面から離れた位置に形成されている。

【0059】これは、前記微小連通部11を容器本体3の壁面に接する位置に形成した場合、物流時などにおいて微小連通部11が上方の位置を占めるようにインクジェットカートリッジが放置されると、容器3の壁面と仕切り壁4とが交差する壁の隅部4Aに毛管力が作用し、隅部4Aを伝わって第2収納室9内のインクが連続的に微小連通部11の位置にまで汲み上げられ、第1収納室5の負圧発生部材6に吸収される結果、前記負圧発生部材6に吸収しきれなかったインクが大気連通口8の周りに溜まり、大気連通口から外部にインクが漏れる恐れがあった。一方、本実施形態では、微小連通部11は容器本体3の壁面から離れた位置に形成されているので、たとえ微小連通部11が上方の位置を占めるような状態にIJCが置かれたとしても、毛管力により隅部4Aを伝って導かれてきたインクが微小連通部11から第1収納室5側に侵入するのを防止することができる。また、侵入したとしても第1収納室5の大気連通口9の手前には十分な大気連通空間15が設けられているので、ここにインクが上述の理由や環境条件の変動等により充満しても、外部に漏れ出すのを抑制することができる。

【0060】図2は本発明にかかる微小連通部11の他の構成例を示す。なお、その形状や寸法は図2に示す例に限られるものではなく、要は、かかる微小連通部16が先にも述べたように隅部4Aから離れた仕切壁4上に穿設されるものであればよい。ただし、余りにもその面積が微小に過ぎるとインクとの間のメニスカス力が強くなり過ぎて、第2収納室9から第1収納室5へのインク補給力が不足し、記録ヘッド1からのインク吐出時にインク切れを起す誘因となる虞がある。また、余りに大き過ぎると逆の現象が発生しがちであり、以上のことから微小連通部11の形成高さは負圧発生部材9に形成される平均孔径（好ましくは微小連通部11近傍の負圧発生部材6に形成される平均孔径）よりも大きく、実用上からいうと0.1mm以上5mm以下であることが好ましい。ただし、より一層安定が期待できる最適寸法としては3mm以下とすることが望ましい。

【0061】これまでに述べてきた実施形態でインクカートリッジ（IJC）を構成する材料としては従来の成形品に用いられるいかなる材料であってもよいが、インクジェット用インクへの影響がないような材料あるいは影響がないように処理された部材から選択する必要がある。また、容器本体3を形成するための樹脂材料に透明あるいは半透明の材料を選択すればインクを収容する第1収納室5および第2収納室9内のインクがインクカートリッジ外部から視認することができるのでインクカートリッジの交換時期を目視にて判断することもできる。

【0062】インクタンクITは、容器本体3と、負圧発生部材6と、インク室9と、負圧発生部材収納部5を

連通する微小連通部11を有する仕切り壁4と、蓋部材12およびインク注入後、インク室を密閉するためのSUS製のボール10Aとで構成されている。かかるインクタンクITを構成するには、図4に示すようにインクタンク本体3の開口25側から負圧発生部材6を負圧発生部材収納部5へ組み込む。この際、負圧発生部材6はあらかじめ圧縮されたものを用いてもかまわない。無圧縮のものを組み込み時に圧縮しながら組み込んでかまわない。どちらの場合でも負圧発生部材6はインク供給口7の負圧発生部材収納部側の周囲に内方に突出する突出部26を設けることにより、負圧発生部材6のインク供給口7側にある部分は他の部分よりタンク容器の開口25側に押圧された状態となる。ここで27は負圧発生部材収納部5と、インク収納部9を仕切り壁4によって形成する際の溶着部である。本実施形態において、溶着部27は、容器本体3に対する段差として構成されちえるので、仕切り壁を所定の位置に容易に固定させることができる。負圧発生部材6は仕切り壁4との密着を良好にするためにこの27の溶着部よりやや開口25側へふくらんだ状態になるような形状とするのが望ましい。また、13は押さえ部材で負圧発生部材6が負圧発生部材収納部5の所望の位置に収まるようにするためのガイドの役割を持っている。

【0063】次に、図5で仕切り壁4をやはりタンク本体3の開口25側から組込み超音波溶着等の手段により仕切り壁4とインクタンク本体3をインクタンク本体内部の溶着部で微小連通部11以外を完全に溶着封止する。これにより図4で示した様な負圧発生部材6のインク供給部材7側のふくらみも他の領域と同様に仕切り壁4に密着するまで圧縮される。

【0064】次に、図6に示すように蓋部材12とインクタンク本体3とを超音波溶着等で完全に封止する。その後蓋部材12のインク充填口10よりインクを注入し、図9に示すようにSUS製のボール10Aを蓋部材12に圧入し、内部容器内のインク室9（後述）を、微小連通部11を除く部分を密閉状態とする。

【0065】負圧発生部材6は、インクタンク本体3の内壁、および仕切り壁4の微小連通部11を設けた面に隙間なく密着させるようにすることが好ましい。

【0066】続いて、図3、図11により本発明が実施もしくは適用される好適なインクジェットユニットIJU、インクカートリッジIJC、および、本発明にかかるIJCを搭載して記録を行うインクジェット記録装置の構成例について説明する。

【0067】本例でのインクジェットカートリッジIJCは、図3（A）の斜視図でわかるように、インクの収納割合が大きくなっているもので、インクタンクITの前方面よりもわずかにインクジェットユニットIJUの先端部が突出した形状である。インクジェットカートリッジは図3（B）に示すように、蓋部材12、インク注

入口10を封入するためのSUS製ボール10A、微小連通部11を有する仕切り壁4、負圧発生部材6を収容し、インクを蓄える容器本体3と、該容器本体3に設けられたインク供給口7からジョイントパイプ（不図示）を介しインクジェット記録ヘッド1にインクを供給するとともにインクジェット記録装置本体IJRAからの印字信号を伝達する部分を有するインクジェットユニット(IJU)29と、該インクジェットユニット(IJU)29を保護するヘッドカバー28により構成されている。ここで負圧発生部材6は圧縮された状態で示されているが、すでに述べ手いるように容器本体3へ組み込む前に所定の圧縮率に圧縮しても、無圧縮のものを組み込み時に圧縮して用いても良い。このインクジェットカートリッジIJCは、インクジェット記録装置本体IJRAに載置されているキャリッジHC不図示の位置決め手段および電気接点とによって固定支持されると共に、該キャリッジHCに対して着脱可能な交換タイプである。

【0068】なお、インクジェットユニットIJU29は、電気信号に応じて膜沸騰をインクに対して生じせしめるための熱エネルギーを生成する電熱変換体を用いて記録を行う方式のユニットである。

【0069】図11は本発明が適用されるインクジェット記録装置IJRAの外観図で、駆動モータ63の正逆回転に連動して駆動力伝達ギア61、59を介して回転するリードスクリュー55の螺旋溝54に対して係合するキャリッジHCはピン（不図示）を有し、矢印a、b方向に往復移動される。52は紙押え板であり、キャリッジ移動方向にわたって紙をプラテン50に対して押圧する。57、58はフォトカブラでキャリッジのレバー56のこの領域での存在を確認してモータ63の回転方向切換等を行うためのホームポジション検知手段である。66は記録ヘッドの前面をキャップするキャップ部材72を支持する部材で、65はこのキャップ内を吸引する吸引手段でキャップ内開口73を介して記録ヘッドの吸引回復を行う。67はクリーニングブレードで、69はこのブレードを前後方向に移動可能にする部材であり、本体支持板68にこれらは支持されている。ブレードは、この形態でなく周知のクリーニングブレードが本例に適用できることはいうまでもない。また、62は、吸引回復の吸引を開始するためのレバーで、キャリッジと係合するカム70の移動に伴って移動し、駆動モータからの駆動力がクラッチ切換等の公知の伝達手段で移動制御される。

【0070】これらのキャッピング、クリーニング、吸引回復は、キャリッジがホームポジション側領域にきたときにリードスクリュー55の作用によってそれらの対応位置で所望の処理が行えるように構成されているが、周知のタイミングで所望の作動を行うようにすれば、本例にはいずれも適用できる。

【0071】図8は負圧発生部材6を異形にしてインク供給口7、微小連通部11側に位置する領域の寸法を(B)に示すように他の部分より大きくしてある例を示す。この場合も同様に仕切り壁4を組付けることによりインク供給口7と微小連通部11に挟まれた領域が高圧縮になるため、上述した実施形態と同様に微小連通部11から出たインクは直接高圧縮領域に入りそのままインク供給口へと導かれる。

【0072】図8ではインク供給口7の周囲が負圧発生部材収納室5側に突き出していない形状を示したが、もちろん、突出した状態のものとし、さらに負圧発生部材6を異形にすることにより、さらに高圧縮化を計っても良い。

【0073】また、かかる突出部を設ける構成としてインク供給部を形成する部材をインク容器に挿入してその端部を内方に突出させるようにしてもよい。

【0074】さらにまた、負圧発生部材6の形状は図8に示した形状に限定されるものでなく台形等の形状でも前記領域を高圧縮化するものであれば何でも良い。

【0075】図9は本発明の第3実施形態によるIJCの構成を示す。本実施形態によるIJCの基本的構成については図1に示したものと変わらないが、本実施形態ではインク残量検知手段として、蓋部材12を透明な材料、例えばアクリル樹脂等耐インク性のあるプラスチック系の材料で形成すると共に、第2収納室9の下部に光学的にインクを検知するための反射板20を設けた。なお、ここでは図示しないが、記録装置（プリンタ）側の例えばキャリッジ上に発光素子と受光素子とからなる光学的センサが設けられていて、第2収納室9におけるインクが無くなると、発光素子から透光された光が透光性蓋部材13を介して第2収納室9内に導かれ、さらに反射板20によって反射されて受光素子に受光されることでインク無しの状態が検知される。なお、本例では第2収納室9内に反射板20を設け、第2収納室9内のインクの有無（インク残量が所定量以下か以上か）を反射型光センサによって検知するようにしたが、反射板20を設けず、透光型の光センサによってインクの有無が検知されるようにした公知のものをを用いることも可能である。さらにまた、図10に示すように第2収納室9の底部近傍に少なくとも一対の電極19を設け、インクが存在する限り一対の電極間に電氣的導通が得られ、インクが無くなることにより前記導通が無くなるが電気抵抗が変化することからインク無しを検知するようにしてもよい。

【0076】このような残量検知機構を設けることにより、使用者がインクタンクのインクを全て使い切る前にインク残量が少ないことを知ることができた。このため、特にこのようなインクタンクを備えたインクジェットカートリッジを用いるファックスでは、インク切れにより受信結果を出力できないという自体を、未然にかつ

安価な方法で避けることができる。

【0077】次に、インクの充填方法、およびその装置構造の概略を説明する。

【0078】本発明のインクタンクにおけるインクの充填は減圧法によって行われる。図12は、本発明の一実施形態に係わるインクタンクのインク注入工程に用いられる装置の構造を示す説明図である。

【0079】はじめに、容器3を治具30にセットし、大気連通口8に大気連通ノズル39を、インク供給口7に線36を、インク充填口10に排気/注入ノズル40を、それぞれセットする。バルブA31とバルブC33を閉じ、バルブB32を開けて、ポンプ35で充分排気を行うとともに、バルブD34を開けて、インク溜38よりインク定量注入器37に必要な分だけインクを補充する。補充が終了した後バルブD34を閉じ、ポンプ35での排気が充分行われたら、バルブB32を閉じる。

【0080】次にバルブC33を開け、インク定量注入器37からインクを容器3内部に定量注入する。定量注入を完了した時点で、すぐにバルブC33を閉じるとともに、バルブA31を開けて、タンク内に残っている負圧を開放する。ここで、インクを容器3に入れる工程からバルブA31を開けてタンク内に残る負圧を開放する工程をほぼ連続して行うことは、タンク内のインクが平衡になろうとして大気連通空間15に流れ出るのを避けることができるので、極めて重要である。

【0081】ここまでの工程が終わった後、バルブA31を閉じ再びタンクを密閉し、排気/注入ノズル40をインク充填口10からはずしてSUS製ボール10Aでインク充填口10を封止する。大気連通ノズル39を大気連通口8から、線36をインク供給口7からはずし、治具からタンクを取り出すことにより、減圧法によるインクの注入工程は完了する。

【0082】このようにインクを減圧注入によって行うことにより、インクの流れは重力の影響や吸収体の疎密の影響を受けることなく、Z方向に進んでからX方向へと進み、負圧発生部材6のインク供給口7と微小連通部11との間に挟まれた領域にも充分インクを含ませることが容易に実現可能である。

【0083】通常、黒インクにおいて、文字をはっきり見せ、印字品質を向上させるためにはそのインク組成中に界面活性剤の入っていないものを用いるのが望ましいが、従来行われている加圧法による注入では、負圧発生部材に対する充分な浸透性がないためにインクが必要部分に充分供給されないという問題があった。

【0084】これは、インクを充填する前の負圧発生部材はインクのかわりに空気が充填されており、負圧発生部材の高圧縮領域は、他の領域に比べてインクの流抵抗が大きくなっているためである。つまり、加圧法による注入の場合、この流抵抗の違いから、インクは負圧発生部材の高圧縮領域、すなわち微小連通部11とインク供

給口7にはさまれた領域6aに充分浸透せず、圧縮率の小さい他の領域6bに偏って充填されてしまう。

【0085】その結果、負圧発生部材6の高圧縮領域6aは内部に気泡を残した形でインク注入が終えられることになり、インク収納部9からインク供給口7へインクが移動する際、内部の気泡が高流抵抗となり、安定したインクの供給を阻害する場合がある。

【0086】しかし、上記の減圧工程を用いることにより、このように界面活性剤のない、浸透性の低いインクについても、重力の影響や吸収体の疎密の影響を受けることなく容易にインクを必要な部分、すなわち負圧発生部材6の、微小連通部11とインク供給口7にはさまれた高圧縮領域6aにも充分注入できる。

【0087】これは、インクを注入する前に容器本体を減圧することで、負圧発生部材中に充填されている空気を取り除かれるため、流抵抗の差が無視できる範囲になるためである。

【0088】この結果、上記負圧発生部材6の高圧縮領域6aは、他の領域6bに比べてインク保持力が高いので、前述したとおり、保存、物流時等の姿勢によらず常に安定してインクを保持できる。また、加圧法による注入と異なり、高圧縮領域6a内部を、気泡を残すことなくインクで充填させることができるので、流抵抗は低くなり、インク収納部9からインク供給口7へ安定してインクを供給できる。

【0089】

【発明の効果】以上説明したように、本発明によれば、インク収納部内のインクが微小連通部を介して直接負圧発生部材の高圧縮領域に導入され、さらにこの高圧縮領域がインク供給口へ連通するように形成されているため、いかなる姿勢での物流、保存や環境変化によってもインク収納部内とインク供給口の間のインクが他の領域へ移動して空気が入り込むことがないので、非常にインク供給性の優れたインクタンクおよびインクジェットカートリッジを提供できる。

【0090】また、微小連通部を前記大気連通口から隔離し、かつ、第2収納室の内壁に沿わない仕切壁の位置に穿設したので、簡易な構造で、姿勢差に関わらず、保存安定性の良好なインクジェットカートリッジを提供することができる。

【0091】また、かかるインクジェットカートリッジから記録ヘッドに安定したインクの供給が得られるインクジェット記録装置を提供することができる。

【0092】また、本発明における製造方法によれば、上記インクカートリッジを簡単な構成で製造することができ、かつ、このような構造のインクタンクに対し、重力の影響や吸収体の粗密の影響を受けずに安定してインクを注入することができる。

【0093】

【図面の簡単な説明】

【図１】本発明の一実施形態にかかるインクジェットカートリッジの構成例を断面図（Ａ）および（Ａ）のX方向から見た矢視図（Ｂ）によって示す説明図である。

【図２】本発明の一実施形態にかかる微小連通部の形状例を（Ａ）および（Ｂ）によって示す説明図である。

【図３】本発明の一実施形態にかかるインクジェットカートリッジの外観図（Ａ）および分解斜視図（Ｂ）である。

【図４】本発明の一実施形態にかかるインクタンクの負圧発生部材を組み込んだ状態を示す図である。

【図５】本発明の一実施形態にかかるインクタンクの仕切り壁を取付けた図である。

【図６】本発明の一実施形態にかかるインクタンクの蓋部材を取り付けた図である。

【図７】本発明の吸収体の圧縮の状態を示す模式図である。

【図８】本発明の他の実施形態にかかるインクタンクを示す図である。

【図９】本発明の他の実施形態にかかるインクタンクを示す図である。

【図１０】本発明の他の実施形態にかかるインクタンクを示す図である。

【図１１】本発明の一実施形態にかかるインクジェットカートリッジを搭載するプリンタを示す図である。

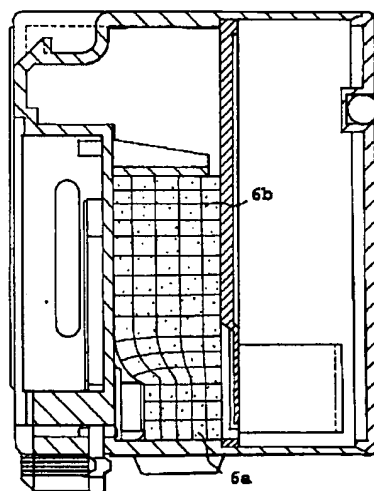
【図１２】本発明の一実施形態にかかるインクタンクの製造装置を示す説明図である。

# 【符号の説明】

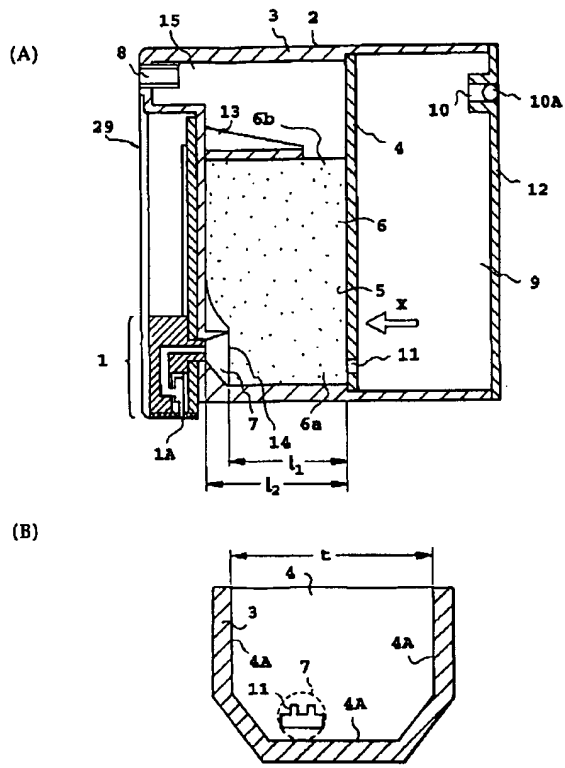
- 1 インクジェット記録ヘッド
- 1 A インク吐出口
- 2 インクタンク部
- 3 容器（本体）
- 4 仕切り壁

- 4 A 隅部
- 5 第1収納室（負圧発生部材収納室）
- 6 負圧発生部材
- 6 a インク供給口と微小連通部に挟まれた領域
- 6 b 6 a 以外の領域
- 7 インク供給口
- 8 大気連通口
- 9 第2収納室（インク収納部）
- 10 インク充填口
- 10 A SUS製ボール
- 11 微小連通部
- 12 蓋部材
- 13 押さえ部材
- 14 フィルタ
- 15 大気連通空間
- 16 パッファ部
- 25 インクタンク本体の開口
- 26 突出部
- 27 溶着部
- 28 ヘッドカバー
- 29 I J U
- 30 治具
- 31 バルブA
- 32 バルブB
- 33 バルブC
- 34 バルブD
- 35 ポンプ
- 36 線
- 37 インク定量注入器
- 38 インク溜
- 39 大気連通ノズル
- 40 排気／注入ノズル

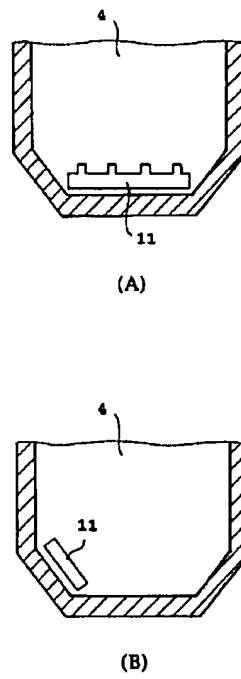
【図7】



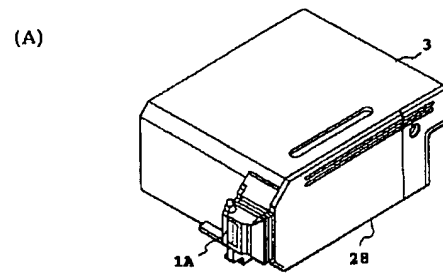
【図 1】



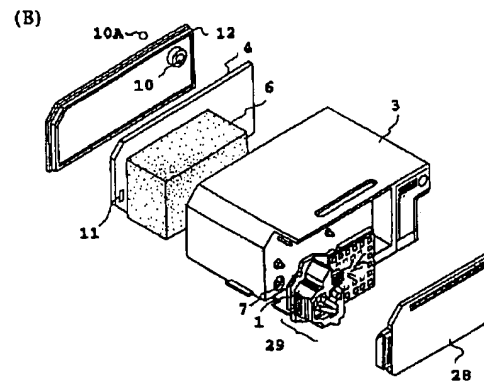
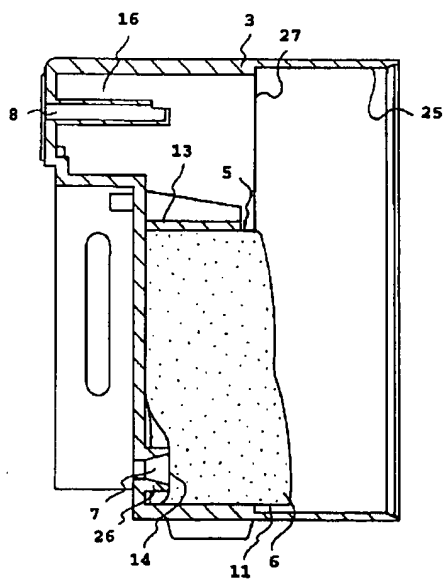
【図 2】



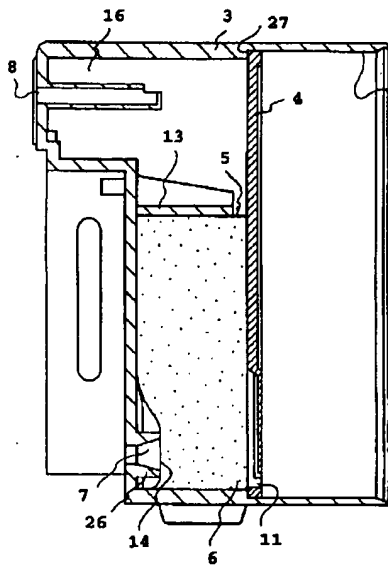
【図 3】



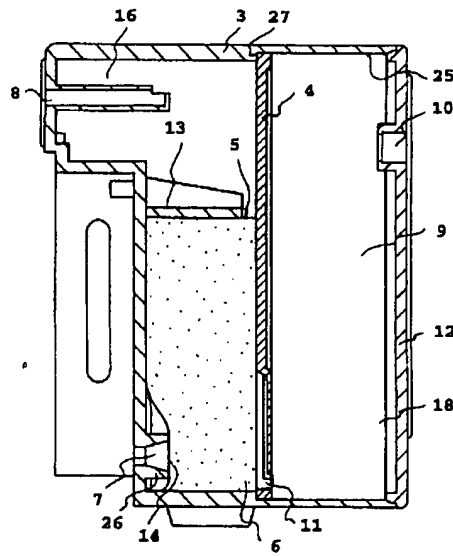
【図 4】



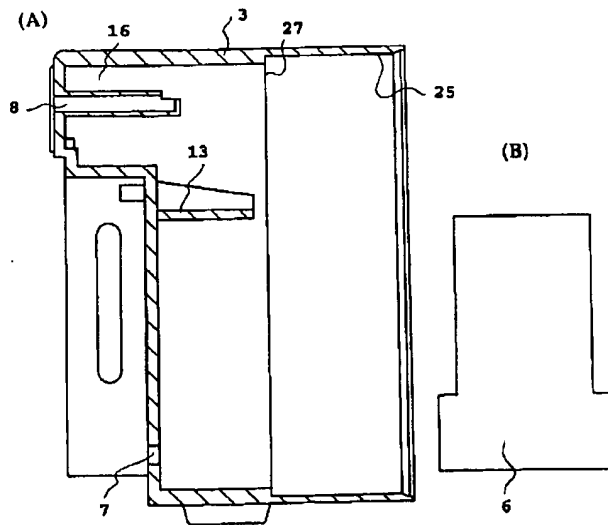
【図5】



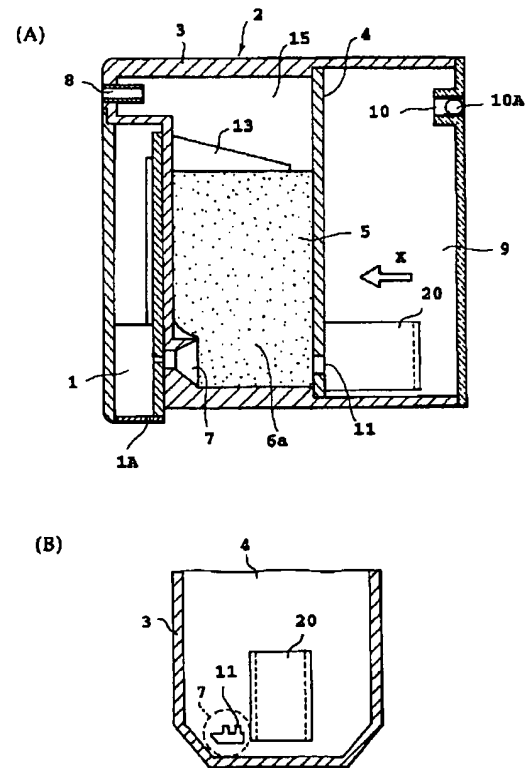
【図6】



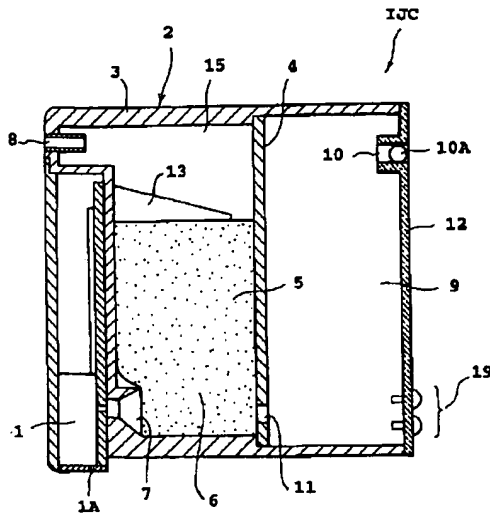
【図8】



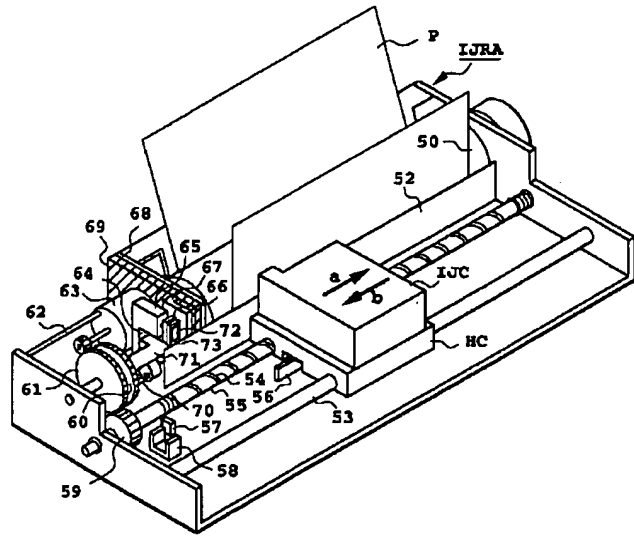
【図9】



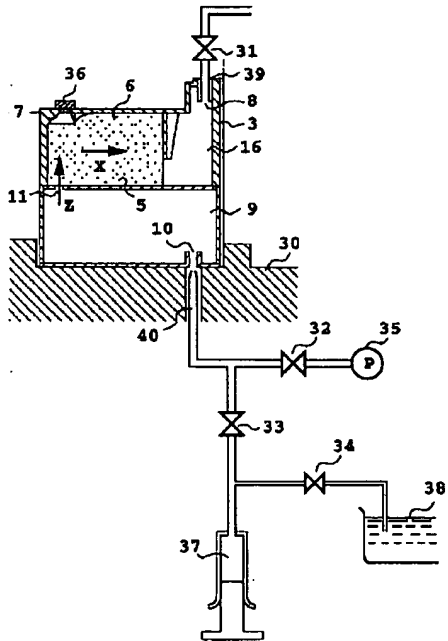
【図10】



【図11】



【図12】





Job : 132  
Date: 6/28/2004  
Time: 5:24:35 PM

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\* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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CLAIMS

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[Claim(s)]

[Claim 1] In the ink tank of the ink jet cartridge which equipped ink jet equipment with the ink jet head whose attachment and detachment are enabled, and the ink tank It has the body of a container which constitutes said ink tank, and the bridgewall which divides this interior of the body of a container into the 1st receipt room and the 2nd receipt room. Said 1st receipt room The ink feed hopper which said ink jet head prepared in the field which countered connects with said bridgewall, and supplies ink, Said bridgewall to the field which was equipped with the atmospheric-air free passage section which is open for free passage to atmospheric air, and contained the negative pressure generating member, and carried out the abbreviation confrontation with the ink feed hopper The migration of ink in said 1st receipt room from said 2nd receipt room, Said negative pressure generating member in the path which is equipped with the minute free passage section in which the migration of air in said 2nd receipt room from said 1st receipt room is made to perform, and connects said ink feed hopper and said minute free passage section is an ink tank characterized by being held at high compression as compared with other fields.

[Claim 2] The perimeter of said ink feed hopper is an ink tank according to claim 1 characterized by having projected to the inner direction.

[Claim 3] Said ink jet head is an ink tank according to claim 1 by which it has the ink supply pipe for introducing ink, and said ink supply pipe is characterized by having projected to said negative pressure generating member side.

[Claim 4] The ink tank according to claim 2 by which the ratio of the die length to the part projected from said bridgewall of said container to the way among said lobes and the die length to the field where the ink feed hopper of the 1st receipt room which counters this bridgewall from said bridgewall is not allotted is characterized by being the range of 2/3 to 3/4.

[Claim 5] The ink tank according to claim 4 by which depth of said container is characterized by the \*\*\*\*\* from the die length to the field where the ink feed hopper of the 1st receipt room which counters this bridgewall from the bridgewall of said container is not allotted.

[Claim 6] The ink tank according to claim 3 by which the ratio of the die length to the part projected from said bridgewall of said container to the way among the ink supply pipes of said ink jet head and the die length to the field where the ink supply pipe of the 1st receipt room which counters this bridgewall from said bridgewall is not arranged is characterized by being the range of 2/3 to 3/4.

[Claim 7] The ink tank according to claim 6 by which depth of said container is characterized by the \*\*\*\*\* from the die length to the field where the ink supply pipe of the 1st receipt room which counters this bridgewall from the bridgewall of said container is not arranged.

[Claim 8] The ink tank according to claim 1 characterized by setting up more greatly than other fields the field equivalent to the field to which the ratio to the inside dimension method of the 1st receipt room concerned of the dimension before holding in said 1st receipt room of said negative pressure generating member changes with fields, and is inserted into said ink feed hopper and said minute free passage section.

[Claim 9] Said minute free passage section is an ink tank according to claim 1 characterized by being surrounded with the bridgewall.

[Claim 10] The ink tank according to claim 1 characterized by preparing the filter in said 1st receipt room side of said ink feed hopper, and carrying out the pressure welding of said negative pressure generating member to the filter concerned.

[Claim 11] The ink tank according to claim 1 characterized by the field where said negative pressure generating member does not exist being near the atmospheric-air free passage section of said 1st receipt room.

[Claim 12] The ink tank according to claim 1 characterized by providing the level difference for fixing said bridgewall to a predetermined location inside said container.

[Claim 13] The ink tank according to claim 1 characterized by the whole surface having translucency among the outer walls which form said 2nd receipt room at least.

[Claim 14] The ink tank according to claim 1 characterized by providing the means for detecting that the ink of said 2nd receipt room became below the specified quantity at least.

[Claim 15] The ink tank according to claim 14 characterized by having the reflecting plate arranged in the outer wall which forms said 2nd receipt room, and in which light transmission is possible, and said 2nd receipt interior of a room as a means for detecting that said ink became below the specified quantity.

[Claim 16] The ink tank according to claim 14 characterized by the thing which was arranged as a means for detecting that said ink became below the specified quantity so that ink might be touched in said 2nd receipt interior of a room, and which have the electrode of a pair at least.

[Claim 17] In the ink tank of the ink jet head whose attachment and detachment to ink jet equipment are enabled, and the ink jet cartridge equipped with the ink tank The container with which the end was opened wide, and the ink feed hopper prepared in the field which faces the open section of this container, The negative pressure generating member held from said open section so that said open section may be touched to the field which carries out phase opposite, While touching to said negative pressure generating member held from said open section, carrying out phase opposite, being joined to the open section in close to the container wall concerned and dividing said container into the 1st stowage and the 2nd stowage The bridgewall which has the minute free passage section which makes said 1st stowage and said 2nd stowage open for free passage, The ink tank characterized by holding the field which was equipped with the covering device material which constitutes said 2nd receipt room from covering the open section of said container between said bridgewalls, and was inserted into said ink feed hopper and said minute free passage section of said negative pressure generating member at high compression as compared with other fields.

[Claim 18] The perimeter of said ink feed hopper is an ink tank according to claim 17 characterized by having projected to the inner direction.

[Claim 19] Said ink jet head is an ink tank according to claim 17 characterized by having the ink supply pipe for introducing ink, and said ink supply pipe breathing out to said negative pressure generating member side.

[Claim 20] The ink tank according to claim 18 by which the ratio of the die length to the part

projected from said bridgewall of said container to the way among said lobes and the die length to the field where the ink feed hopper of the 1st receipt room which counters this bridgewall from said bridgewall is not allotted is characterized by being the range of  $2/3$  to  $3/4$ .

[Claim 21] The ink tank according to claim 20 by which depth of said container is characterized by the \*\*\*\*\* from the die length to the field where the ink feed hopper of the 1st receipt room which counters this bridgewall from the bridgewall of said container is not allotted.

[Claim 22] The ink tank according to claim 19 by which the ratio of the die length to the part projected from said bridgewall of said container to the way among the ink supply pipes of said head and the die length to the field where the ink feed hopper of the 1st receipt room which counters said bridgewall from said bridgewall is not allotted is characterized by being the range of  $2/3$  to  $3/4$ .

[Claim 23] The ink tank according to claim 22 by which depth of said container is characterized by the \*\*\*\*\* from the die length to the field where the ink supply pipe of the 1st receipt room which counters this bridgewall from the bridgewall of said container is not arranged.

[Claim 24] The ink tank according to claim 17 characterized by setting up more greatly than other fields the field equivalent to the field to which the ratio to the inside dimension method of the 1st receipt room concerned of the dimension before holding in said 1st receipt room of said negative pressure generating member changes with fields, and is inserted into said ink feed hopper and said minute free passage section.

[Claim 25] Said minute free passage section is an ink tank according to claim 17 characterized by being surrounded with the bridgewall.

[Claim 26] The ink tank according to claim 17 characterized by preparing the filter in said 1st stowage side of said ink feed hopper, and carrying out the pressure welding of said negative pressure generating member to the filter concerned.

[Claim 27] The ink tank according to claim 17 characterized by the field where said negative pressure generating member does not exist being near the atmospheric-air free passage section of said 1st receipt room.

[Claim 28] The ink tank according to claim 17 characterized by providing the level difference for fixing said bridgewall to a position inside said container.

[Claim 29] The ink tank according to claim 17 characterized by the whole surface having translucency among the outer walls which form said 2nd receipt room at least.

[Claim 30] The ink tank according to claim 17 characterized by providing the means for detecting that the ink of said 2nd receipt room became below the specified quantity at least.

[Claim 31] The ink tank according to claim 30 characterized by having the reflecting plate arranged in the outer wall which forms said 2nd receipt room, and in which light transmission is possible, and said 2nd receipt interior of a room as a means for detecting that said ink became below the specified quantity.

[Claim 32] The ink tank according to claim 30 characterized by the thing which was arranged as a means for detecting that said ink became below the specified quantity so that ink might be touched in said 2nd receipt interior of a room, and which have the electrode of a pair at least.

[Claim 33] In the manufacture approach of the ink tank constituted free [ attachment and detachment ] to an ink jet printer The process which prepares for an ink jet recording head a container equipped with the ink feed hopper which supplies ink, and the atmospheric-air free passage section which is open for free passage to atmospheric air in the field which has opening in an end side and faces opening, The process which holds a negative pressure generating member from said opening so that the field as for which said opening of said container carries

out phase opposite may be touched, The manufacture approach of the ink tank characterized by having the process which inserts a bridgewall so that the bridgewall which has the minute connection section may be stuck to said negative pressure generating member and the perimeter of a container at opening, and the process which joins covering device material to opening of said container.

[Claim 34] The manufacture approach of the ink tank according to claim 33 characterized by sticking so that the field by which said negative pressure generating member of said section [ ink feed hopper and said minute free passage section ] was pinched may be held at high compression in the process which inserts said bridgewall as compared with other fields.

[Claim 35] The manufacture approach of the ink tank according to claim 33 characterized by having the process which pours in ink by reduced pressure impregnation from the ink inlet which seals said atmospheric-air free passage opening and an ink feed hopper, and exists said container or on said covering device material.

[Claim 36] The ink tank manufacture approach according to claim 35 characterized by carrying out reduced pressure impregnation of the ink in the process which pours in said ink with the posture in which the 1st receipt room becomes the vertical upper part of the 2nd receipt room about said container.

[Claim 37] The manufacture approach of the ink tank according to claim 35 characterized by having the process which cancels the negative pressure which opens said atmospheric-air free passage opening wide immediately after specified quantity impregnation, and remains ink in a tank in the process which pours in said ink.

[Claim 38] The manufacture approach of the ink tank according to claim 35 characterized by not including a surfactant in the presentation of the ink to pour in in the process which pours in said ink.

[Claim 39] The ink jet cartridge characterized by consisting of an ink jet head joined to said ink feed hopper of an ink tank according to claim 1 and this ink tank.

[Claim 40] The ink jet cartridge characterized by consisting of an ink jet head joined to said ink feed hopper of an ink tank according to claim 17 and this ink tank.

[Claim 41] The ink jet cartridge characterized by consisting of an ink jet head joined to said ink feed hopper of the ink tank manufactured by the manufacture approach according to claim 33, and this ink tank.

[Claim 42] Said ink jet head is an ink jet cartridge according to claim 39 characterized by having an exoergic resistance element for carrying out the regurgitation of the ink to the liquid flow channel which has a delivery for carrying out the regurgitation of the ink from said ink delivery.

[Claim 43] Said ink jet head is an ink jet cartridge according to claim 40 characterized by having the liquid flow channel which has a delivery for carrying out the regurgitation of the ink, and an exoergic resistance element for carrying out the regurgitation of the ink from said ink delivery.

[Claim 44] Said ink jet head is an ink jet cartridge according to claim 41 characterized by having the liquid flow channel which has a delivery for carrying out the regurgitation of the ink, and an exoergic resistance element for carrying out the regurgitation of the ink from said ink delivery.

[Claim 45] The ink jet recording apparatus with which it is the ink jet recording apparatus equipped with the ink jet cartridge according to claim 39, and said ink jet head cartlidge is characterized by the removable thing to the body of a recording apparatus.

[Claim 46] The ink jet recording apparatus with which it is the ink jet recording apparatus equipped with the ink jet cartridge according to claim 40, and said ink jet head cartlidge is characterized by the removable thing to the body of a recording apparatus.

[Claim 47] The ink jet recording apparatus with which it is the ink jet recording apparatus equipped with the ink jet cartridge according to claim 41, and said ink jet head cartridge is characterized by the removable thing to the body of a recording apparatus.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the ink tank which holds the ink for ink jet record, the ink jet cartridge which equipped it with the recording head, and the manufacture approach of manufacturing it. This invention is applicable to record devices, such as a copying machine, facsimile, etc. which use an ink jet technique, communication equipment, a business machine, a compound device, a printer, etc.

[0002] In addition, record contains not only an image with semantics, such as an alphabetic character, but an image with a meaningless pattern image etc. here. A record device contains all various information processors or the printer as the output machine.

[0003]

[Description of the Prior Art] The recording device with which methods, such as hot printing, LBP and dot impact, and an ink jet, were used is used as output units, such as a personal computer terminal, a copy, and FAX. Although the ink jet method is capturing the spotlight as the printing approach of excelling in silence, in various recording methods, the thing using foaming of the liquid by heating has the description which was [ be / - colorization which is excellent in the - silence with constitutionally easy densification of a recording head / equal to easy and high-speed printing ] excellent, and is capturing the spotlight as the high-definition and cheap printing approach. The ink tank which stores the ink supplied to an ink jet recording head and an ink jet recording head as an example of the record means applied to an ink jet recording apparatus is unified, and there is an ink jet cartridge of the gestalt made exchangeable to the scan carriage with which equipment is equipped.

[0004] By the way, an ink jet cartridge will be discarded with a head, if the ink in an ink tank will be in the condition that the regurgitation cannot be carried out from a recording head. That is, the refill of ink the negative pressure which occurs with a negative pressure generating object with consumption of ink although, as for the ink tank of an ink jet cartridge, a negative pressure generating object is contained inside, ink is held at this and desired negative pressure occurs to a recording head becomes gradually large, and corresponding to the regurgitation of the ink from a recording head cannot be performed, it changes, and use of an ink jet cartridge becomes impossible. By the way, in the cartridge of this condition, although based also on the capacity of a negative pressure generating object, comparatively much ink had remained. The amount of survival of ink is not easy for it improving the capacity of sponge that the ink maintenance capacity of the sponge which is the negative pressure generating object in an ink tank mostly contained by the whole rules over.

[0005] moreover, the negative pressure generating object was difficult to change in the direction in which negative pressure becomes large gradually according to ink consumption, and to maintain the negative pressure of about 1 law from the beginning of using to termination. JP,63-87242,A is mentioned as an example of such an ink jet cartridge.

[0006] The ink jet cartridge which adopted the configuration which holds only ink substantially is developed to this present condition. For example, the ink jet cartridge which has arranged few

porosity members between the primary ink stores dept. which is located up and holds only ink in large quantities, and the ink jet recording head located caudad is indicated by JP,2-522,A. Suppose that the utilization ratio of ink can be improved in this invention by having arranged the porosity member all over ink passage, without building in an ink stores dept. Moreover, by preparing the secondary ink stores dept. as space which can hold ink in the side of a porosity member, when there are environmental variations when a temperature rise (pressure drop) arises, the outflow ink from the primary ink stores dept. by the air in a primary ink stores dept. expanding is collected, and it is supposed that the negative pressure to the recording head at the time of record is uniformly maintainable on parenchyma.

[0007]

[Problem(s) to be Solved by the Invention] However, in invention of the official report mentioned above, since it is made to sink in so that ink passes over a porosity member enough in the ink from the primary ink stores dept. which is located up at the time of un-recording, and holds only ink in large quantities, generating of the negative pressure of the porosity member itself has almost been lost. Therefore, it may arise that ink leaks from the orifice of an ink jet recording head by few impacts, and it cannot necessarily be said to be the thing suitable for practical use.

[0008] On the other hand, a wall divides the interior of the ink tank section into two in one half mostly, and the configuration which contained the negative pressure generating object to \*\* of the side equipped with a recording head is indicated by JP,7-125232,A. And it has the free passage section between the separating wall and the pars basilaris ossis occipitalis, and supply of ink is made. Although the ink supply pipe with which the recording head section was equipped will be inserted in the negative pressure generating object side of the ink tank section in this application when it is indicated as a configuration with disengageable recording head section and ink tank section and the recording head section is attached in the ink tank section, it is indicated that it is the field where the negative pressure generating object around an ink supply pipe is compressed by this.

[0009] When the configuration of this ink tank section was applied to the ink jet cartridge equipped with a recording head in one, the good result was obtained about ink supply, but if the stability in a PD condition is examined, the case where air enters the negative pressure generating inside of the body depending on change of environments, such as arrangement of a cartridge, a temperature change, an allobar, vibration, and an impact, and distribution of ink changes can be considered. therefore , it carry in a recording device , the case where distribution arise also in the ink currently hold at the negative pressure generating member which exist in the field between the free passage section and an ink supply pipe can be consider , when initial recovery action be perform , in an ink path while result [ from the free passage section ] in an ink supply pipe , the air which intervemed move to an ink supply pipe side in this condition , and it happen that it become impossible to secure the path of sufficient ink .

[0010] By the way, a pars basilaris ossis occipitalis is opened wide and the ink tank indicated by JP,7-125232,A inserts a negative pressure generating member from a pars basilaris ossis occipitalis to the member with a separating wall carried out 2 \*\*\*\*s in one, and if it consists of joining a pars-basilaris-ossis-occipitalis wall finally, it will be indicated. However, it is difficult to apply in manufacture of the ink jet cartridge which this constitutes only an ink tank and is equipped with a recording head in one.

[0011] The main purpose of this invention can always supply ink to stability to a recording head, even when the technical problem perceived with the above-mentioned conventional technique is

canceled and what kind of posture and environmental conditions, such as PD, are experienced as an ink jet cartridge, and it is to offer the manufacture approach of the ink tank which can perform record with the good result, an ink jet cartridge, and this cartridge.

[0012] Other purposes of this invention are easy configurations, and are to offer the manufacture approach of an ink tank, an ink jet cartridge, and this ink jet cartridge cheaply.

[0013] Other purposes of this invention are the body of a container which constitutes the; aforementioned ink tank which is offering the ink tank which has the following configurations of the ink jet cartridge which equipped ink jet equipment with the ink jet head whose attachment and detachment are enabled, and the ink tank, and a bridgewall which divides this interior of the body of a container into the 1st receipt room and the 2nd receipt room.

[0014] Here, said ink jet head prepared in the field which countered connected said 1st receipt room with said bridgewall, and it was equipped with the ink feed hopper which supplies ink, and the atmospheric-air free passage section which is open for free passage to atmospheric air, and has contained the negative pressure generating member.

[0015] Moreover, said bridgewall equips the field which carried out the abbreviation confrontation with the ink feed hopper with the minute free passage section in which the migration of ink in said 1st receipt room from said 2nd receipt room and the migration of air in said 2nd receipt room from said 1st receipt room are made to perform.

[0016] And said negative pressure generating member in the path which connects said ink feed hopper and said minute free passage section is held at high compression as compared with other fields.

[0017] Other purposes of this invention are the containers with which; end which is offering the ink tank which has the following configurations of the ink jet head whose attachment and detachment to ink jet equipment are enabled, and the ink jet cartridge equipped with the ink tank was opened wide.

[0018] The ink feed hopper prepared in the field which faces the open section of this container.

[0019] The negative pressure generating member held from said open section so that said open section may be touched to the field which carries out phase opposite.

[0020] The bridgewall which has the minute free passage section which makes said 1st stowage and said 2nd stowage open for free passage while touching to said negative pressure generating member held from said open section, carrying out phase opposite, being joined to the open section in close to the container wall concerned and dividing said container into the 1st stowage and the 2nd stowage.

[0021] Covering device material which constitutes said 2nd receipt room from covering the open section of said container between said bridgewalls.

[0022] The field inserted into said ink feed hopper and said minute free passage section of said negative pressure generating member is held by this at high compression as compared with other fields.

[0023] Other purposes of this invention are processes which prepare for an ink jet recording head a container equipped with the ink feed hopper which supplies ink, and the atmospheric-air free passage section which is open for free passage to atmospheric air in the field which has opening in; end side which is offering the manufacture approach of the ink tank constituted free [ attachment and detachment ] to an ink jet printer including the following processes, and faces opening.

[0024] The process which holds a negative pressure generating member from said opening so that said opening of said container may be touched in the field which carries out phase opposite.



[0025] The process which inserts a bridgewall so that the bridgewall which has the minute connection section may be stuck to said negative pressure generating member and the perimeter of a container at opening.

[0026] The process which joins covering device material to opening of said container.

[0027]

[Means for Solving the Problem] In this invention, compression of the negative pressure generating member between the minute free passage section and an ink feed hopper is highly held by the above configuration. Therefore, since the ink of the 2nd receipt interior of a room is directly introduced into a high compression field, i.e., the large field of capillary force, from the minute free passage section and is led to an ink feed hopper as it is, in any states of preservation, from the 2nd receipt room, ink is stabilized to a feed hopper and can always supply it. That is, it is unrelated to the condition of the ink of other fields of a negative pressure generating member, and an ink supply way is maintained. Moreover, by preparing a filter in the inside edge of an ink feed hopper in the form which carries out a pressure welding to a negative pressure generating member, a meniscus is made into the filter section, the trap of the minute air bubbles which are going to be supplied with ink from a negative pressure generating member side can be carried out, and it is more effective.

[0028]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail with reference to a drawing.

[0029] Drawing 1 (A) shows the cross section which shows the ink jet cartridge concerning 1 operation gestalt of this invention, and (B) expands and shows the part seen from X in drawing.

[0030] An ink jet cartridge is divided into the ink jet unit 29 possessing the ink jet recording head 1, and the ink tank section 2 which holds the ink supplied to this ink jet unit in drawing 1 (A).

[0031] Here, although said ink tank section 2 is constituted by the tank container 3, the covering device material 12, and the bridgewall 4, it has structure divided into the 1st receipt room 5 and the 2nd receipt room 9 with said bridgewall 4.

[0032] Said 1st receipt room 5 holds the negative pressure generating member 6, and possesses the atmospheric-air free passage section 8 which supplies atmospheric air to this negative pressure generating member 6, and the ink feed hopper 7 which supplies ink to said ink jet recording head 1.

[0033] The filter 14 for eliminating the dust in said ink tank section 2 is formed in this ink feed hopper.

[0034] Moreover, between said atmospheric-air free passage section 8 and said negative pressure generating member 6, sufficient atmospheric-air free passage space 15 exists, and this atmospheric-air free passage space 15 is formed in it with the presser-foot plate 13 which carries out compression maintenance of said negative pressure generating member 6.

[0035] On said bridgewall 4, the minute free passage section 11 exists in said ink feed hopper 7 and the location which counters mostly.

[0036] This minute free passage opening 11 was having the perimeter surrounded, and is separated from boundary 4A of said tank container 3 and said bridgewall 4 with said bridgewall 4.

[0037] Said 2nd receipt room 9 is open for free passage in said 1st receipt room 5 in said minute free passage section 11, and holds only the ink supplied to said 1st receipt room.

[0038] Ink is poured into said 2nd receipt room 9 from the ink restoration opening 10 on the covering device material 12. After ink impregnation, in order to prevent the ink leakage from

said ink inlet 19, the closure of said ink restoration opening 10 is carried out by ball 10 made from SUS A.

[0039] The ink supply in this operation gestalt is explained.

[0040] If an ink jet recording apparatus works, ink will be breathed out from the orifice of an ink jet recording head, and an ink suction force will occur on the ink tank IT. Ink is drawn by this suction force in the ink feed zone material 7 through the 1st receipt room (negative pressure generating member stowage) 5 and the negative pressure generating member 6 through the minute free passage section 11 from the 2nd receipt room (ink stowage) 9, and is supplied to an ink jet recording head.

[0041] Thereby, except minute free passage section 11, the pressure inside the sealed ink stowage 9 declines, and differential pressure arises between the ink stowage 9 and the negative pressure generating member stowage 5. If record continues, the differential pressure will continue a rise, but since the negative pressure generating member 6 is wide opened by atmospheric air with the atmospheric-air free passage opening 8, air goes into the ink stowage 9 from the minute free passage section 11 through the negative pressure generating member 6. At this time, the differential pressure between the ink stowage 9 and the negative pressure generating member stowage 5 is canceled. During ink jet record, this actuation is repeated and a certain fixed negative pressure is obtained in an ink tank. Moreover, except the ink adhering to the wall surface in an ink stowage, since the ink in an ink stowage can be used mostly altogether, its ink utilization ratio improves.

[0042] It being the structure overlay important point of this ink tank section is that the ink in the ink stowage 9 is certainly supplied to the ink feed hopper 17 through the minute free passage section 11. In this example, the configuration which holds negative pressure generating member 6a which exists in the field across which it faces in the ink feed hopper 7 and the minute free passage section 11 in the high compression condition compared with negative pressure generating member 6b which exists in other fields is adopted.

[0043] The condition of having made the field across which it faced between the ink feed hoppers 7 of the negative pressure generating member 6 and the minute free passage sections 11 which were held in the negative pressure generating member stowage 5 here hold to high compression as compared with other fields is explained.

[0044] The negative pressure generating member 6 is carrying out the configuration of a rectangular parallelepiped mostly, before containing in the 1st receipt room 5. As shown in drawing 4, in case said negative pressure generating member 6 is included in said 1st receipt room 5 from the opening 25 of the ink tank body 3, it is compressed, as shown in drawing 5, it is carrying out joining closure of the bridgewall 4 at said ink tank body 3, and it is compressed until it sticks the swelling by the side of the ink feed hopper 7 as well as other fields to a bridgewall 4.

[0045] Since the minute free passage section 11 prepared in said bridgewall 4 is formed in the location which meets said ink feed hopper 7 mostly as shown in drawing 1 (B), field 6a inserted between said minute free passage sections 11 and lobes 26 of said ink feed hopper 7 becomes high compression compared with other field 6b. Therefore, if it comes out of the minute free passage section 11, the ink supplied from the ink stowage 9 will enter into the minute free passage section 11 and the high compression zone of the negative pressure generating member 6 pinched by the feed hopper 7 directly, and will be led to an ink feed hopper as it is.

[0046] In addition, the mimetic diagram showing the situation of compression of an absorber is shown in drawing 7.

[0047] In this invention, compression of the negative pressure generating member 6 between the

minute free passage section 11 and the ink feed hopper 7 is highly held by the above configuration. Therefore, since the ink in the 2nd receipt room 9 is directly introduced into high compression field 6a, i.e., the large field of capillary force, from the minute free passage section 11 and is led to the ink feed hopper 7 as it is, in any states of preservation, from the 2nd receipt room 9, ink is stabilized to a feed hopper 7 and can always supply it. That is, it is unrelated to the condition of the ink of other fields of the negative pressure generating member 6, and an ink supply way is maintained. Moreover, by forming a filter 14 in the inside edge of the ink feed hopper 7 in the form which carries out a pressure welding to the negative pressure generating member 6, a meniscus is made into the filter section, the trap of the minute air bubbles which are going to be supplied with ink from a negative pressure generating member side can be carried out, and it is more effective.

[0048] Moreover, there is an advantage which prevents further the ink leak from the atmospheric-air free passage opening 8 by forming the buffer room 15 which made space about eight atmospheric-air free passage openings in the 1st receipt room 5, and abolishing contact to the atmospheric-air free passage opening 8 concerned and the negative pressure generating member 6.

[0049] There is an advantage which can prevent that the ink in an ink tank leaks from the atmospheric-air free passage section to fluctuation of an environmental condition by making this atmospheric-air free passage section side field of the negative pressure generating member 6 into the field which does not hold ink further again.

[0050] Moreover, if it is in a busy condition, an amount as occasion demands can supply efficiently the atmospheric-air free passage side field which does not hold this ink in a cartridge, and atmospheric air has the effectiveness which controls the negative pressure change in an ink tank. Since the osmosis rate of ink itself can be decelerated more as it gets wet and is what is not \*\*, it is desirable, but this atmospheric-air free passage section side field is good also as a field which removed that ink, after [ which is completely depended on ink ] soaking beforehand in ink.

[0051] On the other hand, the receipt room 9 which it is usually hard to generate un-arranging although an operator's finger will be touched, but will contain only ink if a pressure is applied powerfully tends to transform the ink tank 3 of this invention premise configuration, although based also on magnitude. Therefore, it is desirable to form the diaphragm (un-illustrating) which forms the bigger free passage section than the minute free passage section 11 formed in the bridgewall 4 which divides the gap of the 1st receipt room 5 and the 2nd receipt room 9 as a configuration which solves the technical problem by this external pressure in the 2nd receipt room in which only ink is held. Moreover, when these cartridges are formed by resin from a viewpoint of deformation, it is desirable practically to set to 1.3mm or more thickness  $T_s$  of the wall of the receipt room which contains thickness  $T_i$  of the wall of the receipt room of only ink for the sponge as 0.8mm or more and a negative pressure generating member etc. Furthermore, it was proved that it is a practically more desirable thing that the thickness  $T_s$  of a wall is 1.2 or more times within the limits of [ of thickness  $T_i$  of a wall ] 3 or less times.

[0052] Here, the compressibility of the absorber contained is made into about about 4.5 times in this operation gestalt. On the other hand, since the lobe 26 is projected and formed in the perimeter of the ink feed hopper 7 between the bridgewalls 4 which meet the part in which the ink feed hopper 7 is formed, and it, field 6a is made into the high compression zone over the whole, and the compressibility of the field is made into about 6.3 times.

[0053] The die length  $l_2$  of the absorber stowage which drawing 1 (A) which attained the above-

mentioned configuration shows Die length 11 from about 14mm and an ink feed hopper lobe to a bridgewall It is about 10mm and depth t of the absorber stowage shown in drawing 1 (B) is about 22mm.

[0054] In addition, this invention person etc. is the same structure as drawing 1, and is the die length 12 of an absorber stowage. Die length 11 from about 15mm and an ink feed hopper lobe to a bridgewall The tank which is about 10mm was made as an experiment. Also in this configuration, the high compression field which this invention expects can be formed, it is stabilized from an ink stowage to an ink feed hopper, and ink can be supplied.

[0055] In order to form field 6a as a high compression field, it is the die length 12 of an absorber stowage. Die length 11 from an ink feed hopper lobe to a bridgewall Relation is set to one of the important factors. When the die length to an ink feed hopper and a bridgewall is not much long, there is a possibility that a desired high compression condition may no longer be acquired in field 6a. On the contrary, field 6a has a possibility that the supply nature of ink may no longer be obtained fully, although the die length from an ink feed hopper lobe to a bridgewall is formed as a high compression field when too much short compared with the die length of an absorber stowage.

[0056] Moreover, the die length 12 of an absorber stowage Relation with depth t of an absorber stowage is also one of the important factors. The die length 12 of an absorber stowage It receives, and if depth t of an absorber stowage is not much narrow, since the compressibility of the depth direction of an absorber will become large uniformly, it becomes difficult to form a high compression field easily.

[0057] So, in order to form a high compression field easily to field 6a which this invention expects, the rate to the die length of an absorber stowage of the die length from an ink feed hopper lobe to a bridgewall is  $\frac{3}{4}$  or less [  $\frac{2}{3}$  or more ], and the depth of a \*\*\*\*\* of an absorber stowage is more desirable than the die length of an absorber stowage.

[0058] By the way, with this operation gestalt, as shown in drawing 1 (B), the minute free passage section 11 is formed in the location distant from the wall surface of the body 3 of a container.

[0059] If this is left by the ink jet cartridge so that the minute free passage section 11 may occupy an upper location in the time of the PD etc. when said minute free passage section 11 is formed in the location which touches the wall surface of the body 3 of a container Capillary force acts on corner 4A of the wall with which the wall surface and bridgewall 4 of a container 3 cross. Corner 4A is transmitted and the ink in the 2nd receipt room 9 is pumped up continuously even in the location of the minute free passage section 11. As a result of being absorbed by the negative pressure generating member 6 of the 1st receipt room 5, the ink which was not able to be absorbed to said negative pressure generating member 6 collected on the surroundings of the atmospheric-air free passage opening 8, and there was a possibility that ink might leak outside from atmospheric-air free passage opening. On the other hand, with this operation gestalt, since the minute free passage section 11 is formed in the location distant from the wall surface of the body 3 of a container, even if IJC is put on the condition that the minute free passage section 11 occupies an upper location even if, it can prevent that the ink led by being transmitted to corner 4A with capillary force invades into the 1st receipt room 5 side from the minute free passage section 11. Moreover, since sufficient atmospheric-air free passage space 15 is formed before the atmospheric-air free passage opening 9 of the 1st receipt room 5 even if it invades, even if ink is full here with an above-mentioned reason, fluctuation of an environmental condition, etc., it can control beginning to leak outside.

[0060] Drawing 2 shows other examples of a configuration of the minute free passage section 11 concerning this invention. In addition, the configuration or dimension are not restricted to the example shown in drawing 2, and should just be drilled on the bridge wall 4 which is separated from corner 4A as the starting minute free passage section 16 stated also in advance in short. However, if the area passes minutely also to remainder, the meniscus force between ink will become strong too much, the ink supply force from the 2nd receipt room 9 to the 1st receipt room 5 is insufficient, and there is a possibility of becoming the cause which raises an ink piece at the time of the ink regurgitation from a recording head 1. moreover, it is not much alike, and if too large, a reverse phenomenon tends to occur -- the existing average aperture (average aperture preferably formed in the about 11 minute free passage section negative pressure generating member 6) by which it comes out of, and the formation height of the minute free passage section 11 is formed in the negative pressure generating member 9 from the above thing -- large -- practically -- since -- when it says, it is desirable that it is [ 0.1mm or more ] 5mm or less. However, it is desirable to be referred to as 3mm or less as an optimum size which can expect stability further.

[0061] Although you may be what kind of ingredient used for the conventional mold goods as an ingredient which constitutes an ink cartridge (IJC) from an operation gestalt described so far, it is necessary to choose from the member processed so that there might be no ingredient or effect which does not have the effect on the ink for ink jets. Moreover, since the ink in the 1st receipt room 5 in which ink is held, and the 2nd receipt room 9 can check by looking from the ink cartridge outside if transparency or a translucent ingredient is chosen as the resin ingredient for forming the body 3 of a container, the exchange stage of an ink cartridge can also be judged visually.

[0062] The ink tank IT consists of ball 10A made from SUS for sealing an ink room after the body 3 of a container, the negative pressure generating member 6, the ink room 9, the bridgewall 4 that has the minute free passage section 11 which opens the negative pressure generating member stowage 5 for free passage, and the covering device material 12 and ink impregnation. In order to constitute this ink tank IT, as shown in drawing 4, the negative pressure generating member 6 is included in the negative pressure generating member stowage 5 from the opening 25 side of the ink tank body 3. Under the present circumstances, the negative pressure generating member 6 may use what was compressed beforehand. You may incorporate compressing a non-compressed thing at the time of a nest. In both case, when the negative pressure generating member 6 forms the lobe 26 which projects in the inner direction in the perimeter by the side of the negative pressure generating member stowage of the ink feed hopper 7, the part in the ink feed hopper 7 side of the negative pressure generating member 6 will be in the condition of having been pressed at the opening 25 side of a tank container from other parts. 27 is the negative pressure generating member stowage 5 and a welding at the time of forming the ink stowage 9 with a bridgewall 4 here. A welding 27 is constituted as a level difference to the body 3 of a container, is that of \*\*\*\*\* and can make a bridgewall fix to a position easily in this operation gestalt. In order to make adhesion with a bridgewall 4 good, as for the negative pressure generating member 6, it is desirable to consider as a configuration which will be swollen a little from this welding of 27 to an opening 25 side. Moreover, 13 has the role of the guide for making it the negative pressure generating member 6 settled in the location of a request of the negative pressure generating member stowage 5 in a presser-foot member.

[0063] Next, joining closure of except for minute free passage section 11 is too carried out [ a bridgewall 4 ] for a bridgewall 4 and the ink tank body 3 completely by the welding inside an ink

tank body with means, such as nest ultrasonic welding, from the opening 25 side of a tank body 3 by drawing 5 . It is compressed until it sticks the swelling by the side of the ink feed zone material 7 of the negative pressure generating member 6 as this showed by drawing 4 as well as other fields to a bridgewall 4.

[0064] Next, as shown in drawing 6 , the covering device material 12 and the ink tank body 3 are completely closed by ultrasonic welding etc. After that, ink is poured in from the ink restoration opening 10 of the covering device material 12, and as shown in drawing 9 , ball 10A made from SUS is pressed fit in the covering device material 12, and the part excluding the minute free passage section 11 in the ink room 9 (after-mentioned) in an internal container is made into a sealing condition.

[0065] As for the negative pressure generating member 6, it is desirable to make it make it stick to the field in which the minute free passage section 11 of the wall of the ink tank body 3 and a bridgewall 4 was formed without a clearance.

[0066] Then, the example of a configuration of the suitable ink jet unit IJU to which this invention is carried out or applied by drawing 3 and drawing 11 , an ink cartridge IJC, and the ink jet recording device which records by carrying IJC concerning this invention is explained.

[0067] The ink jet cartridge IJC in this example is the configuration which the point of the ink jet unit IJU projected by the receipt rate of ink being large more slightly than the front field of the ink tank IT, as it understands with the perspective view of drawing 3 (A). Ball 10 made from SUS A for an ink jet cartridge to enclose the covering device material 12 and the ink inlet 10, as shown in drawing 3 (B), The body 3 of a container in which the bridgewall 4 and the negative pressure generating member 6 which have the minute free passage section 11 are held, and ink is stored, The ink jet unit 29 which has the part which transmits the printing signal from the body IJRA of an ink jet recording apparatus while supplying ink to the ink jet recording head 1 through a joint pipe (un-illustrating) from the ink feed hopper 7 prepared in this body 3 of a container (IJU), It is constituted by the cylinder-head cover 28 which protects this ink jet unit (IJU) 29. although the negative pressure generating member 6 is shown in the condition of having been compressed here -- already -- stating -- \*\*\*\*\* -- even if it compresses into predetermined compressibility before including in the body 3 of a container like, a non-compressed thing may be incorporated, and you may sometimes compress and use. This ink jet cartridge IJC is a removable exchange type to this carriage HC while fixed support is carried out by carriage HC non-illustrated the positioning means and electric contact which are laid in the body IJRA of an ink jet recording apparatus.

[0068] In addition, the ink jet unit IJU29 is a unit of the method which records using the electric heat conversion object which generates the heat energy for producing and cheating out of film boiling to ink according to an electrical signal.

[0069] Drawing 11 is the external view of the ink jet recording device IJRA with which this invention is applied, the carriage HC engaged to the spiral slot 54 of a leading screw 55 which is interlocked with the forward inverse rotation of a drive motor 63, and is rotated through the driving force transfer gears 61 and 59 has a pin (un-illustrating), and both-way migration is carried out in an arrow head a and the direction of b. 52 is a paper bail plate and presses paper to a platen 50 covering the carriage migration direction. 57 and 58 are the home-position detection means for checking existence [ in this field of the lever 56 of carriage ] with a photo coupler, and performing a hand-of-cut change-over of a motor 63 etc. 66 is the member which supports the cap member 72 which caps the front face of a recording head, and 65 performs suction recovery of a recording head through the opening 73 in a cap with a suction means to attract the inside of

this cap. 67 is a cleaning blade, 69 is a member which makes this blade movable to a cross direction, and these are supported by the body support plate 68. It cannot be overemphasized that not this gestalt but a well-known cleaning blade can apply a blade to this example. Moreover, it is a lever for starting suction of suction recovery, and it moves with migration of the cam 70 which engages with carriage, and, as for 62, migration control of the driving force from a drive motor is carried out with a means of communication with a well-known clutch change-over etc. [0070] When carriage comes to a home-position side field, it is constituted so that a request can be processed according to an operation of a leading screw 55 in those correspondence locations, but if it is made to operate to well-known timing about a request, each can apply these capping, cleaning, and suction recovery to this example.

[0071.] Drawing 8 shows the example which has made larger than other parts the dimension of the field which makes the negative pressure generating member 6 an anomaly, and is located in the ink feed hopper 7 and minute free passage section 11 side as shown in (B). Since the field inserted into the ink feed hopper 7 and the minute free passage section 11 by attaching a bridgewall 4 similarly also in this case becomes high compression, the ink which came out of the minute free passage section 11 like the operation gestalt mentioned above goes into a direct high compression field, and is led to an ink feed hopper as it is.

[0072] Although drawing 8 showed the configuration to which the perimeter of the ink feed hopper 7 has not projected to the negative pressure generating member receipt room 5 side, high-pressure shrinkage may be further measured by considering as the thing in the condition of having projected, of course, and making the negative pressure generating member 6 into an anomaly further.

[0073] Moreover, the member which forms an ink feed zone as a configuration which prepares this lobe is inserted in an ink container, and you may make it make the edge project to the inner direction.

[0074] If the configuration of the negative pressure generating member 6 is not limited to the configuration shown in drawing 8 and high-pressure shrinkage of said field is carried out also in configurations, such as a trapezoid, it is good anything further again.

[0075] Drawing 9 shows the configuration of IJC by the 3rd operation gestalt of this invention. Although it was not different from what was shown in drawing 1 about the fundamental configuration of IJC by this operation gestalt, while forming the covering device material 12 as an ink residue detection means with ingredients of a plastics system with ink-proof nature, such as a transparent ingredient, for example, acrylic resin etc., with this operation gestalt, the reflecting plate 20 for detecting ink optically in the lower part of the 2nd receipt room 9 was formed. In addition, although not illustrated here, if the optical sensor which consists of a light emitting device and a photo detector is formed for example, on the carriage by the side of a recording apparatus (printer) and the ink in the 2nd receipt room 9 is lost, a condition without ink will be detected by it being led in the 2nd receipt room 9 through the translucency covering device material 13, it being further reflected by the reflecting plate 20, and the light by which light transmission was carried out from the light emitting device being received by the photo detector. In addition, although a reflecting plate 20 is formed in the 2nd receipt room 9 and the existence (are ink residues below the specified quantity and the above?) of the ink in the 2nd receipt room 9 was detected with the reflective mold photosensor in this example, it is also possible to use the well-known thing as which a reflecting plate 20 is not formed but the existence of ink was detected by the photosensor of a light transmission mold. As long as it forms the electrode 19 of a pair at least near the pars basilaris ossis occipitalis of the 2nd receipt

room 9 further again as shown in drawing 10 , and ink exists, an electric flow is obtained by inter-electrode [ of a pair ], and although said flow is lost when ink is lost, since electric resistance changes, you may make it detect those without ink.

[0076] By preparing such a residue detector style, before a user exhausts all the ink of an ink tank, it can know that there are few ink residues. For this reason, by the facsimile using the ink jet cartridge especially equipped with such an ink tank, the very thing that a receiving result cannot be outputted with an ink piece is avoidable by the cheap approach before it happens and.

[0077] Next, the restoration approach of ink and the outline of the equipment structure are explained.

[0078] Restoration of the ink in the ink tank of this invention is performed by the manometric method. Drawing 12 is the explanatory view showing the structure of the equipment used for the ink impregnation process of the ink tank concerning 1 operation gestalt of this invention.

[0079] First, a container 3 is set to a fixture 30, a line 36 is set to the ink feed hopper 7, and exhaust air/impregnation nozzle 40 is set to the ink restoration opening 10 for the atmospheric-air free passage nozzle 39 at the atmospheric-air free passage opening 8, respectively. While closing a bulb A31 and a bulb C33, opening a bulb B32 and exhausting enough with a pump 35, a bulb D34 is opened and only a part required for the ink quantum transfer pipet 37 fills up ink from ink \*\* 38. If a bulb D34 is closed and exhaust air with a pump 35 is enough performed after a supplement is completed, a bulb B32 will be closed.

[0080] Next, a bulb C33 is opened and quantum impregnation of the ink is carried out from the ink quantum transfer pipet 37 to the container 3 interior. When quantum impregnation is completed, while closing a bulb C33 immediately, a bulb A31 is opened and the negative pressure which remains in the tank is opened. Since it is avoidable for the ink in a tank to be balancing and to flow into the atmospheric-air free passage space 15, it is very important to perform mostly continuously the process which opens the negative pressure which opens a bulb A31 here from the process which puts ink into a container 3, and remains in a tank.

[0081] After the process so far finishes, a bulb A31 is closed, a tank is sealed again, exhaust air/impregnation nozzle 40 is removed from the ink restoration opening 10, and the ink restoration opening 10 is closed by ball 10made from SUS A. The impregnation process of the ink by the manometric method is completed by removing the atmospheric-air free passage opening 8 to the line 36 for the atmospheric-air free passage nozzle 39 from the ink feed hopper 7, and picking out a tank from a fixture.

[0082] Thus, without the effect of gravity, or influencing the flow of ink of the roughness and fineness of an absorber by performing ink by reduced pressure impregnation, after progressing to a Z direction, it can progress in the direction of X, and including ink enough also in the field across which it faced between the ink feed hopper 7 of the negative pressure generating member 6 and the minute free passage section 11 can be realized easily.

[0083] Usually, in order to show an alphabetic character clearly and to raise a quality of printed character in black ink, as for close [ of a surfactant ], it was desirable during the ink presentation to use what is not, but in impregnation by the inflatable flexible bag technique currently performed conventionally, since there was not sufficient permeability over a negative pressure generating member, there was a problem that ink was not enough supplied to a need part.

[0084] As for the negative pressure generating member before this is filled up with ink, it fills up with air instead of ink, and the high compression field of a negative pressure generating member is because \*\*\*\*\* of ink is large compared with other fields. That is, in impregnation by the inflatable flexible bag technique, from the difference in this \*\*\*\*\* , ink will not permeate



enough field 6a inserted into the high compression field 11 of a negative pressure generating member, i.e., the minute free passage section, and the ink feed hopper 7, but other field 6b with small compressibility will be inclined and filled up with it.

[0085] Consequently, internal air bubbles may serve as quantity style resistance, and high compression field 6a of the negative pressure generating member 6 may check supply of stable ink, in case ink impregnation will be finished in the form where it left air bubbles to the interior and ink moves to the ink feed hopper 7 from the ink stowage 9.

[0086] However, ink can be easily poured enough also into high compression field 6a into which it was inserted by the minute free passage section 11 and the ink feed hopper 7 of the required part 6, i.e., a negative pressure generating member, by using the above-mentioned reduced pressure process also about the low ink of permeability which does not have a surfactant in this way, without the effect of gravity, or being influenced of the roughness and fineness of an absorber.

[0087] This is decompressing the body of a container, before pouring in ink, and since the air with which it fills up into the negative pressure generating member is removed, it is because it becomes the range which can disregard the difference of \*\*\*\*\*.

[0088] Consequently, high compression field 6a of the above-mentioned negative pressure generating member 6 is not based on the postures at the time of preservation and the PD etc., but is always stabilized, and can hold ink as it was mentioned above, since ink holding power was high compared with other field 6b. Moreover, since the interior of high compression field 6a can be made to fill up with ink unlike impregnation by the inflatable flexible bag technique, without leaving air bubbles, \*\*\*\*\* becomes low, is stabilized from the ink stowage 9 to the ink feed hopper 7, and can supply ink.

[0089]

[Effect of the Invention] Since it is formed according to this invention so that the ink in an ink stowage may be introduced into the high compression field of a direct negative pressure generating member through the minute free passage section and this high compression field may be further open for free passage to an ink feed hopper as explained above, Since the ink between ink feed hoppers moves to other fields in an ink stowage and air enters also neither by the PD in what kind of posture, preservation nor the environmental variation, the ink tank and ink jet cartridge which were very excellent in ink supply nature can be offered.

[0090] Moreover, since the location of the bridge wall which isolates the minute free passage section from said atmospheric-air free passage opening, and does not meet the wall of the 2nd receipt room was punctured, with simple structure, it cannot be concerned with a posture difference but an ink jet cartridge with good preservation stability can be offered.

[0091] Moreover, the ink jet recording device with which supply of the ink stabilized in the recording head is obtained from this ink jet cartridge can be offered.

[0092] Moreover, according to the manufacture approach in this invention, it can be stabilized without the effect of gravity, or being able to manufacture the above-mentioned ink cartridge with an easy configuration, and being influenced of the roughness and fineness of an absorber to the ink tank of such structure, and ink can be poured in.

[0093]

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## TECHNICAL FIELD

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[Field of the Invention] This invention relates to the ink tank which holds the ink for ink jet record, the ink jet cartridge which equipped it with the recording head, and the manufacture approach of manufacturing it. This invention is applicable to record devices, such as a copying machine, facsimile, etc. which use an ink jet technique, communication equipment, a business machine, a compound device, a printer, etc.

[0002] In addition, record contains not only an image with semantics, such as an alphabetic character, but an image with a meaningless pattern image etc. here. A record device contains all various information processors or the printer as the output machine.

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## PRIOR ART

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[Description of the Prior Art] The recording device with which methods, such as hot printing, LBP and dot impact, and an ink jet, were used is used as output units, such as a personal computer terminal, a copy, and FAX. Although the ink jet method is capturing the spotlight as the printing approach of excelling in silence, in various recording methods, the thing using foaming of the liquid by heating has the description which was [ be / - colorization which is excellent in the - silence with constitutionally easy densification of a recording head / equal to easy and high-speed printing ] excellent, and is capturing the spotlight as the high-definition and cheap printing approach. The ink tank which stores the ink supplied to an ink jet recording head and an ink jet recording head as an example of the record means applied to an ink jet recording apparatus is unified, and there is an ink jet cartridge of the gestalt made exchangeable to the scan carriage with which equipment is equipped.

[0004] By the way, an ink jet cartridge will be discarded with a head, if the ink in an ink tank will be in the condition that the regurgitation cannot be carried out from a recording head. That is, the refill of ink the negative pressure which occurs with a negative pressure generating object with consumption of ink although, as for the ink tank of an ink jet cartridge, a negative pressure generating object is contained inside, ink is held at this and desired negative pressure occurs to a recording head becomes gradually large, and corresponding to the regurgitation of the ink from a recording head cannot be performed, it changes, and use of an ink jet cartridge becomes impossible. By the way, in the cartridge of this condition, although based also on the capacity of a negative pressure generating object, comparatively much ink had remained. The amount of survival of ink is not easy for it improving the capacity of sponge that the ink maintenance capacity of the sponge which is the negative pressure generating object in an ink tank mostly contained by the whole rules over.

[0005] moreover, the negative pressure generating object was difficult to change in the direction in which negative pressure becomes large gradually according to ink consumption, and to maintain the negative pressure of about 1 law from the beginning of using to termination. JP,63-87242,A is mentioned as an example of such an ink jet cartridge.

[0006] The ink jet cartridge which adopted the configuration which holds only ink substantially is developed to this present condition. For example, the ink jet cartridge which has arranged few porosity members between the primary ink stores dept. which is located up and holds only ink in large quantities, and the ink jet recording head located caudad is indicated by JP,2-522,A. Suppose that the utilization ratio of ink can be improved in this invention by having arranged the porosity member all over ink passage, without building in an ink stores dept. Moreover, by preparing the secondary ink stores dept. as space which can hold ink in the side of a porosity member, when there are environmental variations when a temperature rise (pressure drop) arises,

the outflow ink from the primary ink stores dept. by the air in a primary ink stores dept. expanding is collected, and it is supposed that the negative pressure to the recording head at the time of record is uniformly maintainable on parenchyma.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] As explained above, in this invention, the ink in an ink stowage is introduced into the high compression field of a direct negative pressure generating member through the minute free passage section, since it is formed so that this high compression field may be further open for free passage to an ink feed hopper, the ink between ink feed hoppers moves to other fields in an ink stowage also by the PD in what kind of posture, preservation, or the environmental variation, and air does not enter. Therefore, the ink tank and ink jet cartridge which were very excellent in ink supply nature can be offered.

[0090] Moreover, since the location of the bridge wall which isolates the minute free passage section from said atmospheric-air free passage opening, and does not meet the wall of the 2nd receipt room was punctured, with simple structure, it cannot be concerned with a posture difference but an ink jet cartridge with good preservation stability can be offered.

[0091] Moreover, the ink jet recording device with which supply of the ink stabilized in the recording head is obtained from this ink jet cartridge can be offered.

[0092] Moreover, according to the manufacture approach in this invention, it can be stabilized without the effect of gravity, or being able to manufacture the above-mentioned ink cartridge with an easy configuration, and being influenced of the roughness and fineness of an absorber to the ink tank of such structure, and ink can be poured in.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, in invention of the official report mentioned above, since it is made to sink in so that ink passes over a porosity member enough in the ink from the primary ink stores dept. which is located up at the time of un-recording, and holds only ink in large quantities, generating of the negative pressure of the porosity member itself has almost been lost. Therefore, it may arise that ink leaks from the orifice of an ink jet recording head by few impacts, and it cannot necessarily be said to be the thing suitable for practical use.

[0008] On the other hand, a wall divides the interior of the ink tank section into two in one half mostly, and the configuration which contained the negative pressure generating object to \*\* of the side equipped with a recording head is indicated by JP,7-125232,A. And it has the free passage section between the separating wall and the pars basilaris ossis occipitalis, and supply of ink is made. Although the ink supply pipe with which the recording head section was equipped will be inserted in the negative pressure generating object side of the ink tank section in this application when it is indicated as a configuration with disengageable recording head section and ink tank section and the recording head section is attached in the ink tank section, it is indicated that it is the field where the negative pressure generating object around an ink supply pipe is compressed by this.

[0009] When the configuration of this ink tank section was applied to the ink jet cartridge equipped with a recording head in one, the good result was obtained about ink supply, but if the stability in a PD condition is examined, the case where air enters the negative pressure

generating inside of the body depending on change of environments, such as arrangement of a cartridge, a temperature change, an allobar, vibration, and an impact, and distribution of ink changes can be considered. therefore , it carry in a recording device , the case where distribution arise also in the ink currently hold at the negative pressure generating member which exist in the field between the free passage section and an ink supply pipe can be consider , when initial recovery action be perform , in an ink path while result [ from the free passage section ] in an ink supply pipe , the air which intervned move to an ink supply pipe side in this condition , and it happen that it become impossible to secure the path of sufficient ink .

[0010] By the way, a pars basilaris ossis occipitalis is opened wide and the ink tank indicated by JP,7-125232,A inserts a negative pressure generating member from a pars basilaris ossis occipitalis to the member with a separating wall carried out 2 \*\*\*\*s in one, and if it consists of joining a pars-basilaris-ossis-occipitalis wall finally, it will be indicated. However, it is difficult to apply in manufacture of the ink jet cartridge which this constitutes only an ink tank and is equipped with a recording head in one.

[0011] The main purpose of this invention can always supply ink to stability to a recording head, even when the technical problem perceived with the above-mentioned conventional technique is canceled and what kind of posture and environmental conditions, such as PD, are experienced as an ink jet cartridge, and it is to offer the manufacture approach of the ink tank which can perform record with the good result, an ink jet cartridge, and this cartridge.

[0012] Other purposes of this invention are easy configurations, and are to offer the manufacture approach of an ink tank, an ink jet cartridge, and this ink jet cartridge cheaply.

[0013] Other purposes of this invention are the body of a container which constitutes the; aforementioned ink tank which is offering the ink tank which has the following configurations of the ink jet cartridge which equipped ink jet equipment with the ink jet head whose attachment and detachment are enabled, and the ink tank, and a bridgewall which divides this interior of the body of a container into the 1st receipt room and the 2nd receipt room.

[0014] Here, said ink jet head prepared in the field which countered connected said 1st receipt room with said bridgewall, and it was equipped with the ink feed hopper which supplies ink, and the atmospheric-air free passage section which is open for free passage to atmospheric air, and has contained the negative pressure generating member.

[0015] Moreover, said bridgewall equips the field which carried out the abbreviation confrontation with the ink feed hopper with the minute free passage section in which the migration of ink in said 1st receipt room from said 2nd receipt room and the migration of air in said 2nd receipt room from said 1st receipt room are made to perform.

[0016] And said negative pressure generating member in the path which connects said ink feed hopper and said minute free passage section is held at high compression as compared with other fields.

[0017] Other purposes of this invention are the containers with which; end which is offering the ink tank which has the following configurations of the ink jet head whose attachment and detachment to ink jet equipment are enabled, and the ink jet cartridge equipped with the ink tank was opened wide.

[0018] The ink feed hopper prepared in the field which faces the open section of this container.

[0019] The negative pressure generating member held from said open section so that said open section may be touched to the field which carries out phase opposite.

[0020] The bridgewall which has the minute free passage section which makes said 1st stowage and said 2nd stowage open for free passage while touching to said negative pressure generating

member held from said open section, carrying out phase opposite, being joined to the open section in close to the container wall concerned and dividing said container into the 1st stowage and the 2nd stowage.

[0021] Covering device material which constitutes said 2nd receipt room from covering the open section of said container between said bridgewalls.

[0022] The field inserted into said ink feed hopper and said minute free passage section of said negative pressure generating member is held by this at high compression as compared with other fields.

[0023] Other purposes of this invention are processes which prepare for an ink jet recording head a container equipped with the ink feed hopper which supplies ink, and the atmospheric-air free passage section which is open for free passage to atmospheric air in the field which has opening in; end side which is offering the manufacture approach of the ink tank constituted free [ attachment and detachment ] to an ink jet printer including the following processes, and faces opening.

[0024] The process which holds a negative pressure generating member from said opening so that said opening of said container may be touched in the field which carries out phase opposite.

[0025] The process which inserts a bridgewall so that the bridgewall which has the minute connection section may be stuck to said negative pressure generating member and the perimeter of a container at opening.

[0026] The process which joins covering device material to opening of said container.

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## MEANS

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[Means for Solving the Problem] In this invention, compression of the negative pressure generating member between the minute free passage section and an ink feed hopper is highly held by the above configuration. Therefore, since the ink of the 2nd receipt interior of a room is directly introduced into a high compression field, i.e., the large field of capillary force, from the minute free passage section and is led to an ink feed hopper as it is, in any states of preservation, from the 2nd receipt room, ink is stabilized to a feed hopper and can always supply it. That is, it is unrelated to the condition of the ink of other fields of a negative pressure generating member, and an ink supply way is maintained. Moreover, by preparing a filter in the inside edge of an ink feed hopper in the form which carries out a pressure welding to a negative pressure generating member, a meniscus is made into the filter section, the trap of the minute air bubbles which are going to be supplied with ink from a negative pressure generating member side can be carried out, and it is more effective.

[0028]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail with reference to a drawing.

[0029] Drawing 1 (A) shows the cross section which shows the ink jet cartridge concerning 1 operation gestalt of this invention, and (B) expands and shows the part seen from X in drawing.

[0030] An ink jet cartridge is divided into the ink jet unit 29 possessing the ink jet recording head 1, and the ink tank section 2 which holds the ink supplied to this ink jet unit in drawing 1 (A).

[0031] Here, although said ink tank section 2 is constituted by the tank container 3, the covering device material 12, and the bridgewall 4, it has structure divided into the 1st receipt room 5 and the 2nd receipt room 9 with said bridgewall 4.

[0032] Said 1st receipt room 5 holds the negative pressure generating member 6, and possesses

the atmospheric-air free passage section 8 which supplies atmospheric air to this negative pressure generating member 6, and the ink feed hopper 7 which supplies ink to said ink jet recording head 1.

[0033] The filter 14 for eliminating the dust in said ink tank section 2 is formed in this ink feed hopper.

[0034] Moreover, between said atmospheric-air free passage section 8 and said negative pressure generating member 6, sufficient atmospheric-air free passage space 15 exists, and this atmospheric-air free passage space 15 is formed in it with the presser-foot plate 13 which carries out compression maintenance of said negative pressure generating member 6.

[0035] On said bridgewall 4, the minute free passage section 11 exists in said ink feed hopper 7 and the location which counters mostly.

[0036] This minute free passage opening 11 was having the perimeter surrounded, and is separated from boundary 4A of said tank container 3 and said bridgewall 4 with said bridgewall 4.

[0037] Said 2nd receipt room 9 is open for free passage in said 1st receipt room 5 in said minute free passage section 11, and holds only the ink supplied to said 1st receipt room.

[0038] Ink is poured into said 2nd receipt room 9 from the ink restoration opening 10 on the covering device material 12. After ink impregnation, in order to prevent the ink leakage from said ink inlet 19, the closure of said ink restoration opening 10 is carried out by ball 10 made from SUS A.

[0039] The ink supply in this operation gestalt is explained.

[0040] If an ink jet recording apparatus works, ink will be breathed out from the orifice of an ink jet recording head, and an ink suction force will occur on the ink tank IT. Ink is drawn by this suction force in the ink feed zone material 7 through the 1st receipt room (negative pressure generating member stowage) 5 and the negative pressure generating member 6 through the minute free passage section 11 from the 2nd receipt room (ink stowage) 9, and is supplied to an ink jet recording head.

[0041] Thereby, except minute free passage section 11, the pressure inside the sealed ink stowage 9 declines, and differential pressure arises between the ink stowage 9 and the negative pressure generating member stowage 5. If record continues, the differential pressure will continue a rise, but since the negative pressure generating member 6 is wide opened by atmospheric air with the atmospheric-air free passage opening 8, air goes into the ink stowage 9 from the minute free passage section 11 through the negative pressure generating member 6. At this time, the differential pressure between the ink stowage 9 and the negative pressure generating member stowage 5 is canceled. During ink jet record, this actuation is repeated and a certain fixed negative pressure is obtained in an ink tank. Moreover, except the ink adhering to the wall surface in an ink stowage, since the ink in an ink stowage can be used mostly altogether, its ink utilization ratio improves.

[0042] It being the structure overlay important point of this ink tank section is that the ink in the ink stowage 9 is certainly supplied to the ink feed hopper 17 through the minute free passage section 11. In this example, the configuration which holds negative pressure generating member 6a which exists in the field across which it faces in the ink feed hopper 7 and the minute free passage section 11 in the high compression condition compared with negative pressure generating member 6b which exists in other fields is adopted.

[0043] The condition of having made the field across which it faced between the ink feed hoppers 7 of the negative pressure generating member 6 and the minute free passage sections 11

which were held in the negative pressure generating member stowage 5 here hold to high compression as compared with other fields is explained.

[0044] The negative pressure generating member 6 is carrying out the configuration of a rectangular parallelepiped mostly, before containing in the 1st receipt room 5. As shown in drawing 4, in case said negative pressure generating member 6 is included in said 1st receipt room 5 from the opening 25 of the ink tank body 3, it is compressed, as shown in drawing 5, it is carrying out joining closure of the bridgewall 4 at said ink tank body 3, and it is compressed until it sticks the swelling by the side of the ink feed hopper 7 as well as other fields to a bridgewall 4.

[0045] Since the minute free passage section 11 prepared in said bridgewall 4 is formed in the location which meets said ink feed hopper 7 mostly as shown in drawing 1 (B), field 6a inserted between said minute free passage sections 11 and lobes 26 of said ink feed hopper 7 becomes high compression compared with other field 6b. Therefore, if it comes out of the minute free passage section 11, the ink supplied from the ink stowage 9 will enter into the minute free passage section 11 and the high compression zone of the negative pressure generating member 6 pinched by the feed hopper 7 directly, and will be led to an ink feed hopper as it is.

[0046] In addition, the mimetic diagram showing the situation of compression of an absorber is shown in drawing 7.

[0047] In this invention, compression of the negative pressure generating member 6 between the minute free passage section 11 and the ink feed hopper 7 is highly held by the above configuration. Therefore, since the ink in the 2nd receipt room 9 is directly introduced into high compression field 6a, i.e., the large field of capillary force, from the minute free passage section 11 and is led to the ink feed hopper 7 as it is, in any states of preservation, from the 2nd receipt room 9, ink is stabilized to a feed hopper 7 and can always supply it. That is, it is unrelated to the condition of the ink of other fields of the negative pressure generating member 6, and an ink supply way is maintained. Moreover, by forming a filter 14 in the inside edge of the ink feed hopper 7 in the form which carries out a pressure welding to the negative pressure generating member 6, a meniscus is made into the filter section, the trap of the minute air bubbles which are going to be supplied with ink from a negative pressure generating member side can be carried out, and it is more effective.

[0048] Moreover, there is an advantage which prevents further the ink leak from the atmospheric-air free passage opening 8 by forming the buffer room 15 which made space about eight atmospheric-air free passage openings in the 1st receipt room 5, and abolishing contact to the atmospheric-air free passage opening 8 concerned and the negative pressure generating member 6.

[0049] There is an advantage which can prevent that the ink in an ink tank leaks from the atmospheric-air free passage section to fluctuation of an environmental condition by making this atmospheric-air free passage section side field of the negative pressure generating member 6 into the field which does not hold ink further again.

[0050] Moreover, if it is in a busy condition, an amount as occasion demands can supply efficiently the atmospheric-air free passage side field which does not hold this ink in a cartridge, and atmospheric air has the effectiveness which controls the negative pressure change in an ink tank. Since the osmosis rate of ink itself can be decelerated more as it gets wet and is what is not \*\*, it is desirable, but this atmospheric-air free passage section side field is good also as a field which removed that ink, after [ which is completely depended on ink ] soaking beforehand in ink.

[0051] On the other hand, the receipt room 9 which it is usually hard to generate un-arranging

although an operator's finger will be touched, but will contain only ink if a pressure is applied powerfully tends to transform the ink tank 3 of this invention premise configuration, although based also on magnitude. Therefore, it is desirable to form the diaphragm (un-illustrating) which forms the bigger free passage section than the minute free passage section 11 formed in the bridgewall 4 which divides the gap of the 1st receipt room 5 and the 2nd receipt room 9 as a configuration which solves the technical problem by this external pressure in the 2nd receipt room in which only ink is held. Moreover, when these cartridges are formed by resin from a viewpoint of deformation, it is desirable practically to set to 1.3mm or more thickness  $T_s$  of the wall of the receipt room which contains thickness  $T_i$  of the wall of the receipt room of only ink for the sponge as 0.8mm or more and a negative pressure generating member etc. Furthermore, it was proved that it is a practically more desirable thing that the thickness  $T_s$  of a wall is 1.2 or more times within the limits of [ of thickness  $T_i$  of a wall ] 3 or less times.

[0052] Here, the compressibility of the absorber contained is made into about about 4.5 times in this operation gestalt. On the other hand, since the lobe 26 is projected and formed in the perimeter of the ink feed hopper 7 between the bridgewalls 4 which meet the part in which the ink feed hopper 7 is formed, and it, field 6a is made into the high compression zone over the whole, and the compressibility of the field is made into about 6.3 times.

[0053] The die length l2 of the absorber stowage which drawing 1 (A) which attained the above-mentioned configuration shows Die length l1 from about 14mm and an ink feed hopper lobe to a bridgewall It is about 10mm and depth t of the absorber stowage shown in drawing 1 (B) is about 22mm.

[0054] In addition, this invention person etc. is the same structure as drawing 1 , and is the die length l2 of an absorber stowage. Die length l1 from about 15mm and an ink feed hopper lobe to a bridgewall The tank which is about 10mm was made as an experiment. Also in this configuration, the high compression field which this invention expects can be formed, it is stabilized from an ink stowage to an ink feed hopper, and ink can be supplied.

[0055] In order to form field 6a as a high compression field, it is the die length l2 of an absorber stowage. Die length l1 from an ink feed hopper lobe to a bridgewall Relation is set to one of the important factors. When the die length to an ink feed hopper and a bridgewall is not much long, there is a possibility that a desired high compression condition may no longer be acquired in field 6a. On the contrary, field 6a has a possibility that the supply nature of ink may no longer be obtained fully, although the die length from an ink feed hopper lobe to a bridgewall is formed as a high compression field when too much short compared with the die length of an absorber stowage.

[0056] Moreover, the die length l2 of an absorber stowage Relation with depth t of an absorber stowage is also one of the important factors. The die length l2 of an absorber stowage It receives, and if depth t of an absorber stowage is not much narrow, since the compressibility of the depth direction of an absorber will become large uniformly, it becomes difficult to form a high compression field easily.

[0057] So, in order to form a high compression field easily to field 6a which this invention expects, the rate to the die length of an absorber stowage of the die length from an ink feed hopper lobe to a bridgewall is  $\frac{3}{4}$  or less [  $\frac{2}{3}$  or more ], and the depth of a \*\*\*\*\* of an absorber stowage is more desirable than the die length of an absorber stowage.

[0058] By the way, with this operation gestalt, as shown in drawing 1 (B), the minute free passage section 11 is formed in the location distant from the wall surface of the body 3 of a container.



[0059] If this is left by the ink jet cartridge so that the minute free passage section 11 may occupy an upper location in the time of the PD etc. when said minute free passage section 11 is formed in the location which touches the wall surface of the body 3 of a container Capillary force acts on corner 4A of the wall with which the wall surface and bridgewall 4 of a container 3 cross. Corner 4A is transmitted and the ink in the 2nd receipt room 9 is pumped up continuously even in the location of the minute free passage section 11. As a result of being absorbed by the negative pressure generating member 6 of the 1st receipt room 5, the ink which was not able to be absorbed to said negative pressure generating member 6 collected on the surroundings of the atmospheric-air free passage opening 8, and there was a possibility that ink might leak outside from atmospheric-air free passage opening. On the other hand, with this operation gestalt, since the minute free passage section 11 is formed in the location distant from the wall surface of the body 3 of a container, even if IJC is put on the condition that the minute free passage section 11 occupies an upper location even if, it can prevent that the ink led by being transmitted to corner 4A with capillary force invades into the 1st receipt room 5 side from the minute free passage section 11. Moreover, since sufficient atmospheric-air free passage space 15 is formed before the atmospheric-air free passage opening 9 of the 1st receipt room 5 even if it invades, even if ink is full here with an above-mentioned reason, fluctuation of an environmental condition, etc., it can control beginning to leak outside.

[0060] Drawing 2 shows other examples of a configuration of the minute free passage section 11 concerning this invention. In addition, the configuration or dimension are not restricted to the example shown in drawing 2, and should just be drilled on the bridge wall 4 which is separated from corner 4A as the starting minute free passage section 16 stated also in advance in short. However, if the area passes minutely also to remainder, the meniscus force between ink will become strong too much, the ink supply force from the 2nd receipt room 9 to the 1st receipt room 5 is insufficient, and there is a possibility of becoming the cause which raises an ink piece at the time of the ink regurgitation from a recording head 1. moreover, it is not much alike, and if too large, a reverse phenomenon tends to occur -- the existing average aperture (average aperture preferably formed in the about 11 minute free passage section negative pressure generating member 6) by which it comes out of, and the formation height of the minute free passage section 11 is formed in the negative pressure generating member 9 from the above thing -- large -- practically -- since -- when it says, it is desirable that it is [ 0.1mm or more ] 5mm or less. However, it is desirable to be referred to as 3mm or less as an optimum size which can expect stability further.

[0061] Although you may be what kind of ingredient used for the conventional mold goods as an ingredient which constitutes an ink cartridge (IJC) from an operation gestalt described so far, it is necessary to choose from the member processed so that there might be no ingredient or effect which does not have the effect on the ink for ink jets. Moreover, since the ink in the 1st receipt room 5 in which ink is held, and the 2nd receipt room 9 can check by looking from the ink cartridge outside if transparency or a translucent ingredient is chosen as the resin ingredient for forming the body 3 of a container, the exchange stage of an ink cartridge can also be judged visually.

[0062] The ink tank IT consists of ball 10A made from SUS for sealing an ink room after the body 3 of a container, the negative pressure generating member 6, the ink room 9, the bridgewall 4 that has the minute free passage section 11 which opens the negative pressure generating member stowage 5 for free passage, and the covering device material 12 and ink impregnation. In order to constitute this ink tank IT, as shown in drawing 4, the negative pressure generating

member 6 is included in the negative pressure generating member stowage 5 from the opening 25 side of the ink tank body 3. Under the present circumstances, the negative pressure generating member 6 may use what was compressed beforehand. You may incorporate compressing a non-compressed thing at the time of a nest. In both case, when the negative pressure generating member 6 forms the lobe 26 which projects in the inner direction in the perimeter by the side of the negative pressure generating member stowage of the ink feed hopper 7, the part in the ink feed hopper 7 side of the negative pressure generating member 6 will be in the condition of having been pressed at the opening 25 side of a tank container from other parts. 27 is the negative pressure generating member stowage 5 and a welding at the time of forming the ink stowage 9 with a bridgewall 4 here. A welding 27 is constituted as a level difference to the body 3 of a container, is that of \*\*\*\*\* and can make a bridgewall fix to a position easily in this operation gestalt. In order to make adhesion with a bridgewall 4 good, as for the negative pressure generating member 6, it is desirable to consider as a configuration which will be swollen a little from this welding of 27 to an opening 25 side. Moreover, 13 has the role of the guide for making it the negative pressure generating member 6 settled in the location of a request of the negative pressure generating member stowage 5 in a presser-foot member.

[0063] Next, joining closure of except for minute free passage section 11 is too carried out [ a bridgewall 4 ] for a bridgewall 4 and the ink tank body 3 completely by the welding inside an ink tank body with means, such as nest ultrasonic welding, from the opening 25 side of a tank body 3 by drawing 5 . It is compressed until it sticks the swelling by the side of the ink feed zone material 7 of the negative pressure generating member 6 as this showed by drawing 4 as well as other fields to a bridgewall 4.

[0064] Next, as shown in drawing 6 , the covering device material 12 and the ink tank body 3 are completely closed by ultrasonic welding etc. After that, ink is poured in from the ink restoration opening 10 of the covering device material 12, and as shown in drawing 9 , ball 10A made from SUS is pressed fit in the covering device material 12, and the part excluding the minute free passage section 11 in the ink room 9 (after-mentioned) in an internal container is made into a sealing condition.

[0065] As for the negative pressure generating member 6, it is desirable to make it make it stick to the field in which the minute free passage section 11 of the wall of the ink tank body 3 and a bridgewall 4 was formed without a clearance.

[0066] Then, the example of a configuration of the suitable ink jet unit IJU to which this invention is carried out or applied by drawing 3 and drawing 11 , an ink cartridge IJC, and the ink jet recording device which records by carrying IJC concerning this invention is explained.

[0067] The ink jet cartridge IJC in this example is the configuration which the point of the ink jet unit IJU projected by the receipt rate of ink being large more slightly than the front field of the ink tank IT, as it understands with the perspective view of drawing 3 (A). Ball 10 made from SUS A for an ink jet cartridge to enclose the covering device material 12 and the ink inlet 10, as shown in drawing 3 (B), The body 3 of a container in which the bridgewall 4 and the negative pressure generating member 6 which have the minute free passage section 11 are held, and ink is stored, The ink jet unit 29 which has the part which transmits the printing signal from the body IJRA of an ink jet recording apparatus while supplying ink to the ink jet recording head 1 through a joint pipe (un-illustrating) from the ink feed hopper 7 prepared in this body 3 of a container (IJU), It is constituted by the cylinder-head cover 28 which protects this ink jet unit (IJU) 29. although the negative pressure generating member 6 is shown in the condition of having been compressed here -- already -- stating -- \*\*\*\*\* -- even if it compresses into

predetermined compressibility before including in the body 3 of a container like, a non-compressed thing may be incorporated, and you may sometimes compress and use. This ink jet cartridge IJC is a removable exchange type to this carriage HC while fixed support is carried out by carriage HC non-illustrated the positioning means and electric contact which are laid in the body IJRA of an ink jet recording apparatus.

[0068] In addition, the ink jet unit IJU29 is a unit of the method which records using the electric heat conversion object which generates the heat energy for producing and cheating out of film boiling to ink according to an electrical signal.

[0069] Drawing 11 is the external view of the ink jet recording device IJRA with which this invention is applied, the carriage HC engaged to the spiral slot 54 of a leading screw 55 which is interlocked with the forward inverse rotation of a drive motor 63, and is rotated through the driving force transfer gears 61 and 59 has a pin (un-illustrating), and both-way migration is carried out in an arrow head a and the direction of b. 52 is a paper bail plate and presses paper to a platen 50 covering the carriage migration direction. 57 and 58 are the home-position detection means for checking existence [ in this field of the lever 56 of carriage ] with a photo coupler, and performing a hand-of-cut change-over of a motor 63 etc. 66 is the member which supports the cap member 72 which caps the front face of a recording head, and 65 performs suction recovery of a recording head through the opening 73 in a cap with a suction means to attract the inside of this cap. 67 is a cleaning blade, 69 is a member which makes this blade movable to a cross direction, and these are supported by the body support plate 68. It cannot be overemphasized that not this gestalt but a well-known cleaning blade can apply a blade to this example. Moreover, it is a lever for starting suction of suction recovery, and it moves with migration of the cam 70 which engages with carriage, and, as for 62, migration control of the driving force from a drive motor is carried out with a means of communication with a well-known clutch change-over etc. [0070] When carriage comes to a home-position side field, it is constituted so that a request can be processed according to an operation of a leading screw 55 in those correspondence locations, but if it is made to operate to well-known timing about a request, each can apply these capping, cleaning, and suction recovery to this example.

[0071] Drawing 8 shows the example which has made larger than other parts the dimension of the field which makes the negative pressure generating member 6 an anomaly, and is located in the ink feed hopper 7 and minute free passage section 11 side as shown in (B). Since the field inserted into the ink feed hopper 7 and the minute free passage section 11 by attaching a bridgewall 4 similarly also in this case becomes high compression, the ink which came out of the minute free passage section 11 like the operation gestalt mentioned above goes into a direct high compression field, and is led to an ink feed hopper as it is.

[0072] Although drawing 8 showed the configuration to which the perimeter of the ink feed hopper 7 has not projected to the negative pressure generating member receipt room 5 side, high-pressure shrinkage may be further measured by considering as the thing in the condition of having projected, of course, and making the negative pressure generating member 6 into an anomaly further.

[0073] Moreover, the member which forms an ink feed zone as a configuration which prepares this lobe is inserted in an ink container, and you may make it make the edge project to the inner direction.

[0074] If the configuration of the negative pressure generating member 6 is not limited to the configuration shown in drawing 8 and high-pressure shrinkage of said field is carried out also in configurations, such as a trapezoid, it is good anything further again.

[0075] Drawing 9 shows the configuration of IJC by the 3rd operation gestalt of this invention. Although it was not different from what was shown in drawing 1 about the fundamental configuration of IJC by this operation gestalt, while forming the covering device material 12 as an ink residue detection means with ingredients of a plastics system with ink-proof nature, such as a transparent ingredient, for example, acrylic resin etc., with this operation gestalt, the reflecting plate 20 for detecting ink optically in the lower part of the 2nd receipt room 9 was formed. In addition, although not illustrated here, if the optical sensor which consists of a light emitting device and a photo detector is formed for example, on the carriage by the side of a recording apparatus (printer) and the ink in the 2nd receipt room 9 is lost, a condition without ink will be detected by it being led in the 2nd receipt room 9 through the translucency covering device material 13, it being further reflected by the reflecting plate 20, and the light by which light transmission was carried out from the light emitting device being received by the photo detector. In addition, although a reflecting plate 20 is formed in the 2nd receipt room 9 and the existence (are ink residues below the specified quantity and the above?) of the ink in the 2nd receipt room 9 was detected with the reflective mold photosensor in this example, it is also possible to use the well-known thing as which a reflecting plate 20 is not formed but the existence of ink was detected by the photosensor of a light transmission mold. As long as it forms the electrode 19 of a pair at least near the pars basilaris ossis occipitalis of the 2nd receipt room 9 further again as shown in drawing 10, and ink exists, an electric flow is obtained by inter-electrode [ of a pair ], and although said flow is lost when ink is lost, since electric resistance changes, you may make it detect those without ink.

[0076] By preparing such a residue detector style, before a user exhausts all the ink of an ink tank, it can know that there are few ink residues. For this reason, by the facsimile using the ink jet cartridge especially equipped with such an ink tank, the very thing that a receiving result cannot be outputted with an ink piece is avoidable by the cheap approach before it happens and.

[0077] Next, the restoration approach of ink and the outline of the equipment structure are explained.

[0078] Restoration of the ink in the ink tank of this invention is performed by the manometric method. Drawing 12 is the explanatory view showing the structure of the equipment used for the ink impregnation process of the ink tank concerning 1 operation gestalt of this invention.

[0079] First, a container 3 is set to a fixture 30, a line 36 is set to the ink feed hopper 7, and exhaust air/impregnation nozzle 40 is set to the ink restoration opening 10 for the atmospheric-air free passage nozzle 39 at the atmospheric-air free passage opening 8, respectively. While closing a bulb A31 and a bulb C33, opening a bulb B32 and exhausting enough with a pump 35, a bulb D34 is opened and only a part required for the ink quantum transfer pipet 37 fills up ink from ink \*\* 38. If a bulb D34 is closed and exhaust air with a pump 35 is enough performed after a supplement is completed, a bulb B32 will be closed.

[0080] Next, a bulb C33 is opened and quantum impregnation of the ink is carried out from the ink quantum transfer pipet 37 to the container 3 interior. When quantum impregnation is completed, while closing a bulb C33 immediately, a bulb A31 is opened and the negative pressure which remains in the tank is opened. Since it is avoidable for the ink in a tank to be balancing and to flow into the atmospheric-air free passage space 15, it is very important to perform mostly continuously the process which opens the negative pressure which opens a bulb A31 here from the process which puts ink into a container 3, and remains in a tank.

[0081] After the process so far finishes, a bulb A31 is closed, a tank is sealed again, exhaust air/impregnation nozzle 40 is removed from the ink restoration opening 10, and the ink

restoration opening 10 is closed by ball 10 made from SUS A. The impregnation process of the ink by the manometric method is completed by removing the atmospheric-air free passage opening 8 to the line 36 for the atmospheric-air free passage nozzle 39 from the ink feed hopper 7, and picking out a tank from a fixture.

[0082] Thus, without the effect of gravity, or influencing the flow of ink of the roughness and fineness of an absorber by performing ink by reduced pressure impregnation, after progressing to a Z direction, it can progress in the direction of X, and including ink enough also in the field across which it faced between the ink feed hopper 7 of the negative pressure generating member 6 and the minute free passage section 11 can be realized easily.

[0083] Usually, in order to show an alphabetic character clearly and to raise a quality of printed character in black ink, as for close [ of a surfactant ], it was desirable during the ink presentation to use what is not, but in impregnation by the inflatable flexible bag technique currently performed conventionally, since there was not sufficient permeability over a negative pressure generating member, there was a problem that ink was not enough supplied to a need part.

[0084] As for the negative pressure generating member before this is filled up with ink, it fills up with air instead of ink, and the high compression field of a negative pressure generating member is because \*\*\*\*\* of ink is large compared with other fields. That is, in impregnation by the inflatable flexible bag technique, from the difference in this \*\*\*\*\* , ink will not permeate enough field 6a inserted into the high compression field 11 of a negative pressure generating member, i.e., the minute free passage section, and the ink feed hopper 7, but other field 6b with small compressibility will be inclined and filled up with it.

[0085] Consequently, internal air bubbles may serve as quantity style resistance, and high compression field 6a of the negative pressure generating member 6 may check supply of stable ink, in case ink impregnation will be finished in the form where it left air bubbles to the interior and ink moves to the ink feed hopper 7 from the ink stowage 9.

[0086] However, ink can be easily poured enough also into high compression field 6a into which it was inserted by the minute free passage section 11 and the ink feed hopper 7 of the required part 6, i.e., a negative pressure generating member, by using the above-mentioned reduced pressure process also about the low ink of permeability which does not have a surfactant in this way, without the effect of gravity, or being influenced of the roughness and fineness of an absorber.

[0087] This is decompressing the body of a container, before pouring in ink, and since the air with which it fills up into the negative pressure generating member is removed, it is because it becomes the range which can disregard the difference of \*\*\*\*\*.

[0088] Consequently, high compression field 6a of the above-mentioned negative pressure generating member 6 is not based on the postures at the time of preservation and the PD etc., but is always stabilized, and can hold ink as it was mentioned above, since ink holding power was high compared with other field 6b. Moreover, since the interior of high compression field 6a can be made to fill up with ink unlike impregnation by the inflatable flexible bag technique, without leaving air bubbles, \*\*\*\*\* becomes low, is stabilized from the ink stowage 9 to the ink feed hopper 7, and can supply ink.

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view showing the example of a configuration of the ink jet

cartridge concerning 1 operation gestalt of this invention with the view Fig. (B) seen a sectional view (A) and from [ of (A) ] X.

[Drawing 2] It is the explanatory view showing the example of a configuration of the minute free passage section concerning 1 operation gestalt of this invention by (A) and (B).

[Drawing 3] It is the external view (A) and decomposition perspective view (B) of an ink jet cartridge concerning 1 operation gestalt of this invention.

[Drawing 4] It is drawing showing the condition of having incorporated the negative pressure generating member of the ink tank concerning 1 operation gestalt of this invention.

[Drawing 5] It is drawing furnished with the bridgewall of the ink tank concerning 1 operation gestalt of this invention.

[Drawing 6] It is drawing in which the covering device material of the ink tank concerning 1 operation gestalt of this invention was attached.

[Drawing 7] It is the mimetic diagram showing the condition of compression of the absorber of this invention.

[Drawing 8] It is drawing showing the ink tank concerning other operation gestalten of this invention.

[Drawing 9] It is drawing showing the ink tank concerning other operation gestalten of this invention.

[Drawing 10] It is drawing showing the ink tank concerning other operation gestalten of this invention.

[Drawing 11] It is drawing showing the printer which carries the ink jet cartridge concerning 1 operation gestalt of this invention.

[Drawing 12] It is the explanatory view showing the manufacturing installation of the ink tank concerning 1 operation gestalt of this invention.

[Description of Notations]

1 Ink Jet Recording Head

1A Ink delivery

2 Ink Tank Section

3 Container (Body)

4 Bridgewall

4A Corner

5 1st Receipt Room (Negative Pressure Generating Member Receipt Room)

6 Negative Pressure Generating Member

6a The field inserted into an ink feed hopper and the minute free passage section

6b Fields other than 6a

7 Ink Feed Hopper

8 Atmospheric-Air Free Passage Opening

9 2nd Receipt Room (Ink Stowage)

10 Ink Restoration Opening

10A The ball made from SUS

11 Minute Free Passage Section

12 Covering Device Material

13 Presser-Foot Member

14 Filter

15 Atmospheric-Air Free Passage Space

16 Buffer Section

25 Opening of Ink Tank Body  
26 Lobe  
27 Welding  
28 Cylinder-head Cover  
29 IJU  
30 Fixture  
31 Bulb A  
32 Bulb B  
33 Bulb C  
34 Bulb D  
35 Pump  
36 Line  
37 Ink Quantum Transfer Pipet  
38 Ink \*\*  
39 Atmospheric-Air Free Passage Nozzle  
40 Exhaust Air/Impregnation Nozzle

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CORRECTION OR AMENDMENT

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[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law

[Section partition] The 4th partition of the 2nd section

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[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] Claim

[Method of Amendment] Modification

[Proposed Amendment]

[Claim(s)]

[Claim 1] In the ink tank of the ink jet cartridge which equipped ink jet equipment with the ink jet head whose attachment and detachment are enabled, and the ink tank,

It has the body of a container which constitutes said ink tank, and the bridgewall which divides

this interior of the body of a container into the 1st receipt room and the 2nd receipt room, Said ink jet head prepared in the field which countered connects said 1st receipt room with said bridgewall, and it is equipped with the ink feed hopper which supplies ink, and the atmospheric-air free passage section which is open for free passage to atmospheric air, and contains a negative pressure generating member,

To the field which carried out the abbreviation confrontation with the ink feed hopper, said bridgewall The migration of ink in said 1st receipt room from said 2nd receipt room, Said negative pressure generating member in the path which is equipped with the minute free passage section in which the migration of air in said 2nd receipt room from said 1st receipt room is made to perform, and connects said ink feed hopper and said minute free passage section is an ink tank characterized by being held at high compression as compared with other fields.

[Claim 2] The perimeter of said ink feed hopper is an ink tank according to claim 1 characterized by having projected to the inner direction.

[Claim 3] Said ink jet head is an ink tank according to claim 1 or 2 by which it has the ink supply pipe for introducing ink, and said ink supply pipe is characterized by having projected to said negative pressure generating member side.

[Claim 4] The ink tank according to claim 2 or 3 by which the ratio of the die length to the part projected from said bridgewall of said container to the way among said lobes and the die length to the field where the ink feed hopper of the 1st receipt room which counters this bridgewall from said bridgewall is not allotted is characterized by being the range of  $2/3$  to  $3/4$ .

[Claim 5] The ink tank according to claim 4 by which depth of said container is characterized by the \*\*\*\*\* from the die length to the field where the ink feed hopper of the 1st receipt room which counters this bridgewall from the bridgewall of said container is not allotted.

[Claim 6] The ink tank according to claim 1 to 5 characterized by setting up more greatly than other fields the field equivalent to the field to which the ratio to the inside dimension method of the 1st receipt room concerned of the dimension before holding in said 1st receipt room of said negative pressure generating member changes with fields, and is inserted into said ink feed hopper and said minute free passage section.

[Claim 7] The ink tank according to claim 1 to 6 characterized by providing the level difference for fixing said bridgewall to a predetermined location inside said container.

[Claim 8] The ink tank according to claim 1 to 7 characterized by providing the means for detecting that the ink of said 2nd receipt room became below the specified quantity at least.

[Claim 9] The ink tank according to claim 8 characterized by having the reflecting plate arranged in the outer wall which forms said 2nd receipt room, and in which light transmission is possible, and said 2nd receipt interior of a room as a means for detecting that said ink became below the specified quantity.

[Claim 10] The ink tank according to claim 9 characterized by the thing which was arranged as a means for detecting that said ink became below the specified quantity so that ink might be touched in said 2nd receipt interior of a room, and which have the electrode of a pair at least.

[Claim 11] The ink tank according to claim 1 to 10 characterized by the compressibility of the field inserted into said ink feed hopper and said minute free passage section of said negative pressure generating member being abbreviation homogeneity.

[Claim 12] In the ink tank of the ink jet head whose attachment and detachment to ink jet equipment are enabled, and the ink jet cartridge equipped with the ink tank,

The container with which the end was opened wide,

The ink feed hopper prepared in the field which faces the open section of this container,



The negative pressure generating member held from said open section so that said open section may be touched to the field which carries out phase opposite,

The bridgewall which has the minute free passage section which makes said 1st stowage and said 2nd stowage open for free passage while touching to said negative pressure generating member held from said open section, carrying out phase opposite, being joined to the open section in close to the container wall concerned and dividing said container into the 1st stowage and the 2nd stowage,

Covering device material which constitutes said 2nd receipt room from covering the open section of said container between said bridgewalls,

\*\*\*\*\*, the ink tank characterized by holding the field inserted into said ink feed hopper and said minute free passage section of said negative pressure generating member at high compression as compared with other fields.

[Claim 13] In the manufacture approach of the ink tank constituted free [ attachment and detachment ] to an ink jet printer,

The process which prepares for an ink jet recording head a container equipped with the ink feed hopper which supplies ink, and the atmospheric-air free passage section which is open for free passage to atmospheric air in the field which has opening in an end side and faces opening,

The process which holds a negative pressure generating member from said opening so that the field as for which said opening of said container carries out phase opposite may be touched,

The process which inserts a bridgewall so that the bridgewall which has the minute connection section may be stuck to said negative pressure generating member and the perimeter of a container at opening,

The process which joins covering device material to opening of said container,

\*\*\*\* -- the manufacture approach of the ink tank characterized by things the bottom.

[Claim 14] The manufacture approach of the ink tank according to claim 13 characterized by sticking so that the field by which said negative pressure generating member of said section [ ink feed hopper and said minute free passage section ] was pinched may be held at high compression in the process which inserts said bridgewall as compared with other fields.

[Claim 15] The manufacture approach of the ink tank according to claim 13 characterized by having the process which pours in ink by reduced pressure impregnation from the ink inlet which seals said atmospheric-air free passage opening and an ink feed hopper, and exists said container or on said covering device material.

[Claim 16] The ink tank manufacture approach according to claim 15 characterized by carrying out reduced pressure impregnation of the ink in the process which pours in said ink with the posture in which the 1st receipt room becomes the vertical upper part of the 2nd receipt room about said container.

[Claim 17] The manufacture approach of the ink tank according to claim 15 characterized by having the process which cancels the negative pressure which opens said atmospheric-air free passage opening wide immediately after specified quantity impregnation, and remains ink in a tank in the process which pours in said ink.

[Claim 18] The manufacture approach of the ink tank according to claim 15 characterized by not including a surfactant in the presentation of the ink to pour in in the process which pours in said ink.

[Claim 19] It is the ink jet cartridge characterized by being the ink jet cartridge which has the ink jet head which has an exoergic resistance element for carrying out the regurgitation of the ink to the liquid flow channel which has a delivery for carrying out the regurgitation of the ink from

said ink delivery, and an ink tank according to claim 1 to 12, and joining said ink jet head to said ink feed hopper of an ink tank.

[Claim 20] The ink jet recording apparatus with which it is the ink jet recording apparatus equipped with the ink jet cartridge according to claim 19, and said ink jet head cartlidge is characterized by the removable thing to the body of a recording apparatus.

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] 0046

[Method of Amendment] Modification

[Proposed Amendment]

[0046] In addition, although the situation of compression of an absorber is shown in drawing 7, the field across which it faced between the ink feed hopper 7 minute free passage sections 11 of the negative pressure generating member 6 is in the almost uniform compression condition.

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[Translation done.]